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SEE PAGE 182



IN THIS ISSUE

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A 1932 DECLARATION OF INDEPENDENCE



U.S. PATENT 1852265

ISSUED APRIL 5, 1932
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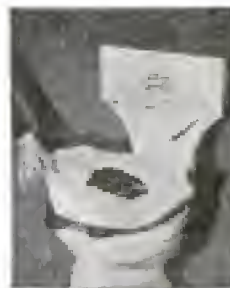
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Frank Boyer ~~Allophane~~ [Contents—Continued]

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WE take pleasure in listing below the names and addresses of the winners of our Prize Contests Numbers 1 and 2. Checks were mailed to the winners on July 1st.

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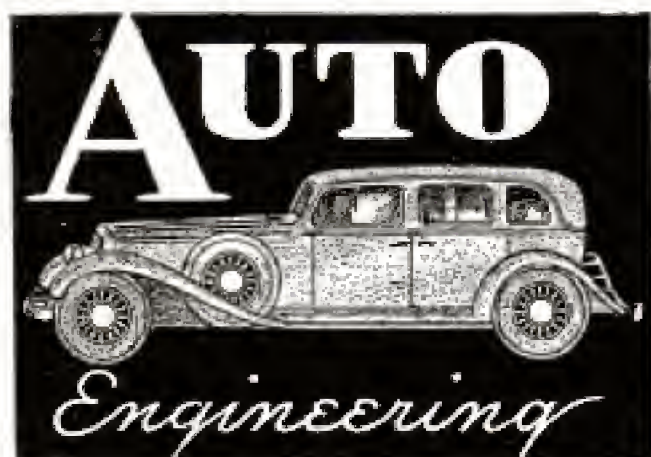
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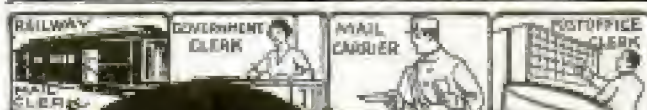
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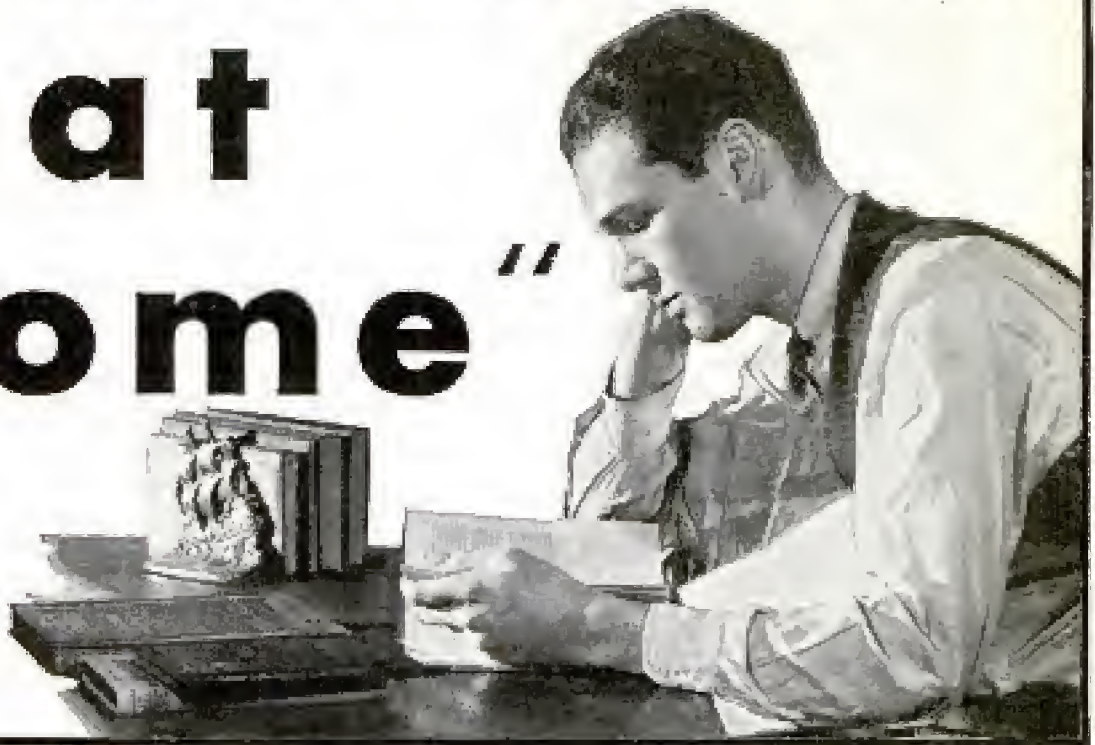
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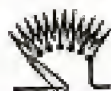
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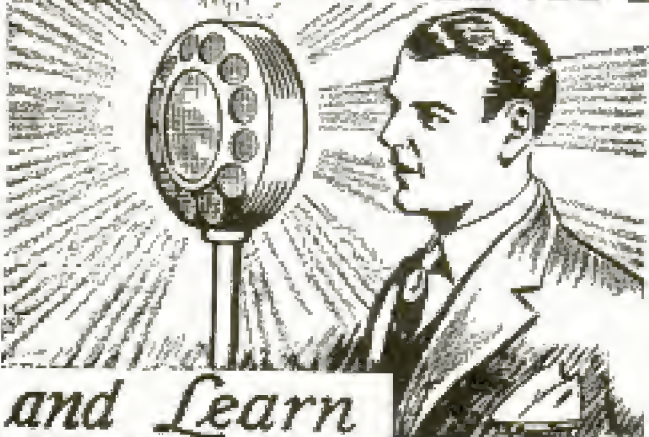
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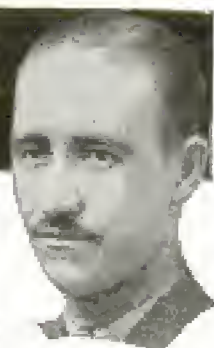
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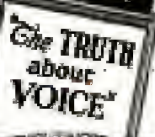
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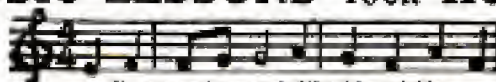
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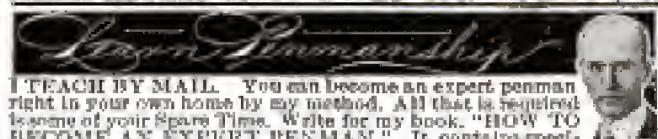
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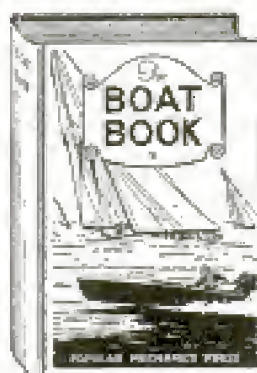
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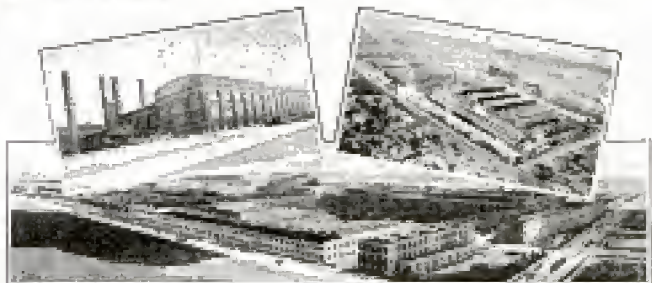
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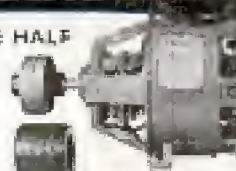
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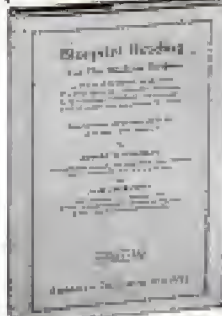
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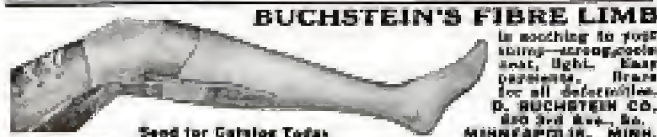
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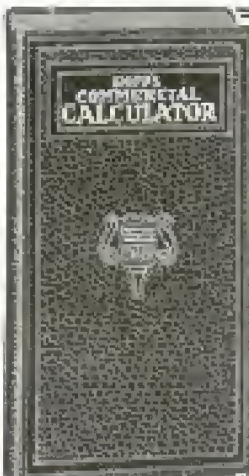
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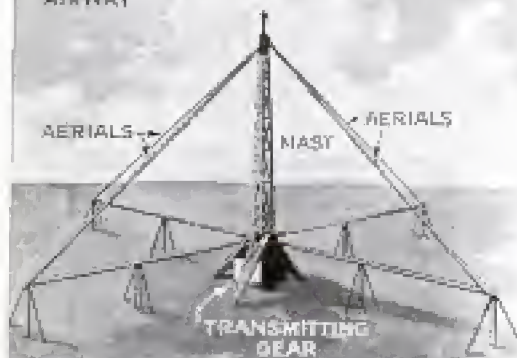
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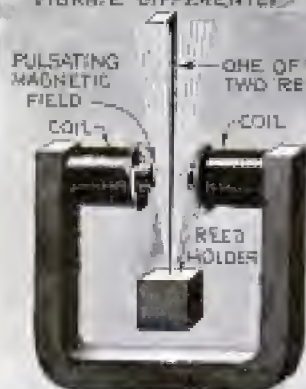
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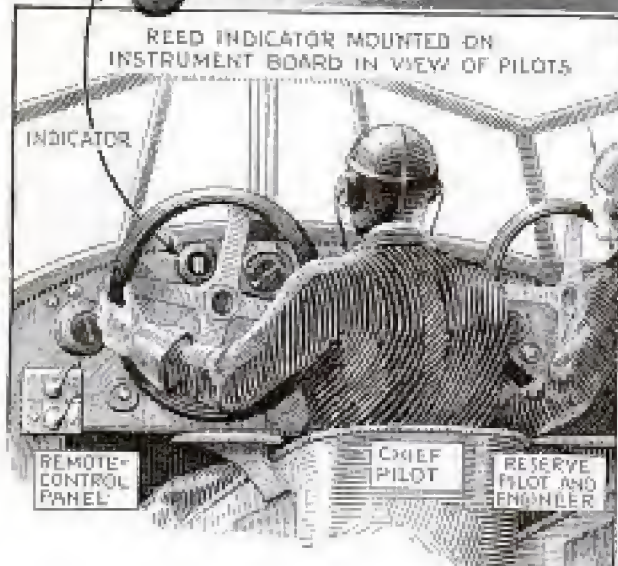
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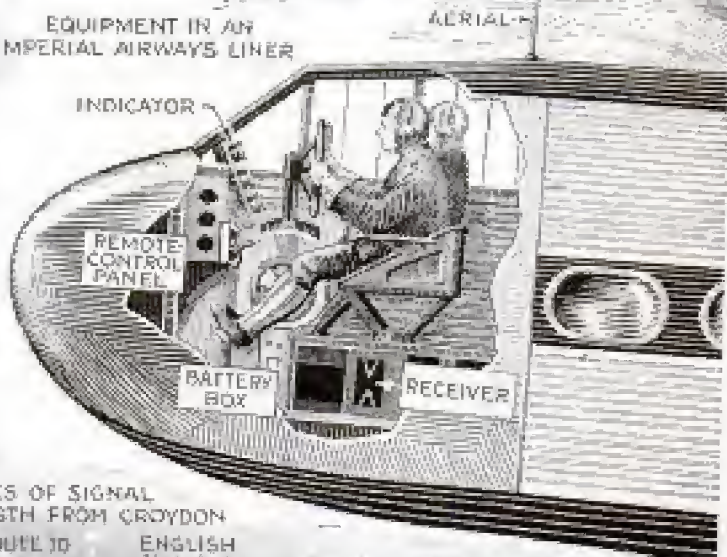
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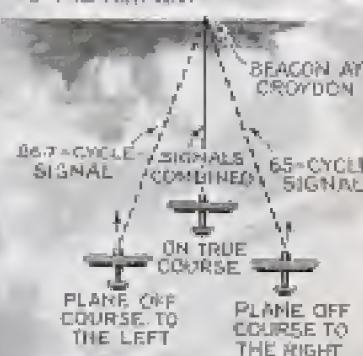
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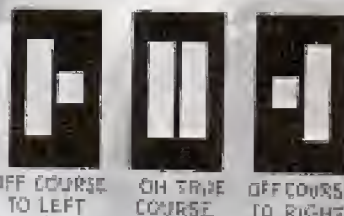
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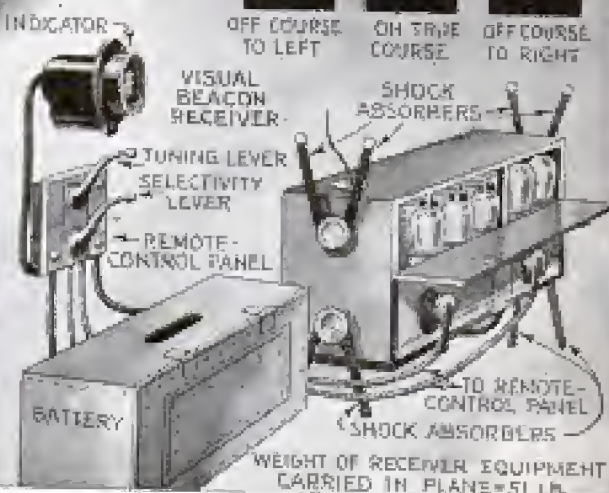
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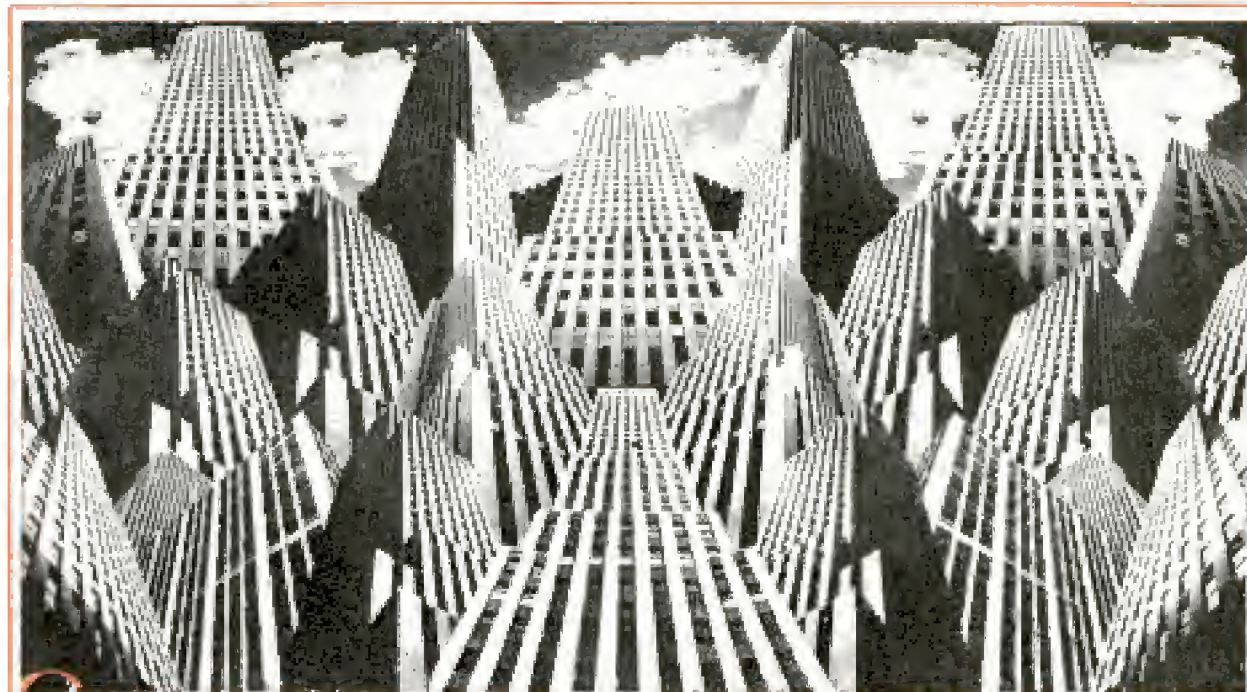
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Vol. 58

AUGUST 1932

No. 2



Skyscraper

By D. H. BURNHAM

Director of Works, Century of Progress

THE president of a big corporation emerges from a meeting at which a new home for his company had been discussed.

"We have decided," he announces casually, "to erect a seventy-five story office building. It will be ready in six months. In twenty years we will salvage the material and build another one."

Such an announcement today would seem preposterous, and it would be if the building were constructed of the same materials and by the same methods used in the past. However, in a few years, or perhaps even in a few months, we may expect skyscrapers to go up in 180 days and be replaced in two decades.

These structures will have their inception in the laboratory rather than the

stone quarry and the lumber pile, for they will be composed almost entirely of synthetic materials new to the building industry. They will be built to last just so long as their elevators, plumbing and other mechanical fixtures may be expected to remain serviceable, and no longer.

Visitors to Chicago's Century of Progress exposition next summer will see groups of buildings not only unusual in appearance but unique in construction. Because human nature is opposed to change, many will consider them flamboyant in appearance and too angular in line. As a matter of fact, they are the result of economic necessity and not of a desire to construct something spectacular. Through the sale of display space, these structures must pay for themselves during the 150

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days the fair lasts. For this reason, we have been forced to resort to new methods of building and have found, somewhat to our surprise, that many of these methods and short cuts are applicable likewise to permanent structures. Nearly every world's fair leaves its impression on architecture for the next generation. Whether the coming exposition will do so, time alone can tell, but it seems likely that our experience will teach an economic lesson of importance, at least.

Planes and surfaces characterize this architecture instead of classical lines or a parade of plaster, ornamentation and decoration. Instead of expensive exteriors,

we are depending on the dramatic effects of lights and bright colors to furnish a background both new and inspiring. As a result, we are building for less than fourteen cents a cubic foot of space.

We are using some new building materials and making new uses of old ones. Nearly everything is factory-made. Wall materials, for instance, are pre-fabricated in shops, cut into standard shapes and sizes, and arrive ready to be put in place. These sections are applied with clips and screws, instead of nails and rivets. The materials are light in weight and easy to handle. They require less steel for support and less labor to

install. The framework for these structures is of light steel, bolted together to enable easy demolition. The outer walls of one building are composed entirely of asbestos-cement board, hitherto used principally in small units for interior insulation. The space between

The Synthetic Skyscraper

IT will be built for thirty cents a cubic foot, compared to seventy-five cents today.

It will be erected in half the time now required.

Its useful life will be limited to twenty years, after which it will be salvaged.

Walls will be only three or four inches thick, the outer ones enameled, the inner of composition material with insulation between.

It will be virtually windowless, illumination coming from neon hidden in portable torcheres.

Its heating plant will purify and humidify the air, and maintain a cool temperature in summer.

It will bring about stabilization of present property values and tend to break up shifting of business areas.



Top, Waterfall Effect for One of Chicago Fair Buildings; Below, Interior of Hall of Science

outer walls and inner ones of plaster board is filled with insulating material made of waste paper and emulsified asphalt. Such insulation in these three-inch walls is equivalent to that provided by a seventeen-inch brick wall.

Walls of the Travel and Transport building are made of sections of sheet metal, clipped or welded to the steel frame. The Electrical group utilizes standard gypsum board for its walls with a coating of metallic paint. The walls of the Hall of Science are nothing more than a veneer of five thicknesses of plywood. Virtually all buildings are without windows, which



Top, Workmen Clipping on Walls of World's Fair Building; Below, Lines and Angles of the Hall of Science

are expensive, while sunshine is variable, so artificial lighting give better illumination than nature can offer, and the interior exhibits will be brilliantly lighted even on dark rainy days; also these buildings, because of their artificial ventilation, will be cool on the hottest summer days.

The buildings are only temporary structures, but by utilizing new materials, we suggest a way to lower costs for permanent structures. Office buildings of the past were erected to last a century. The interior mechanical equipment is usually out of date or worn out in fifteen or twenty years, and the cost of wrecking such a structure when it is obviously obsolete is not only high but takes months to accomplish.

We, therefore, must now erect

(Continued to page 118A)

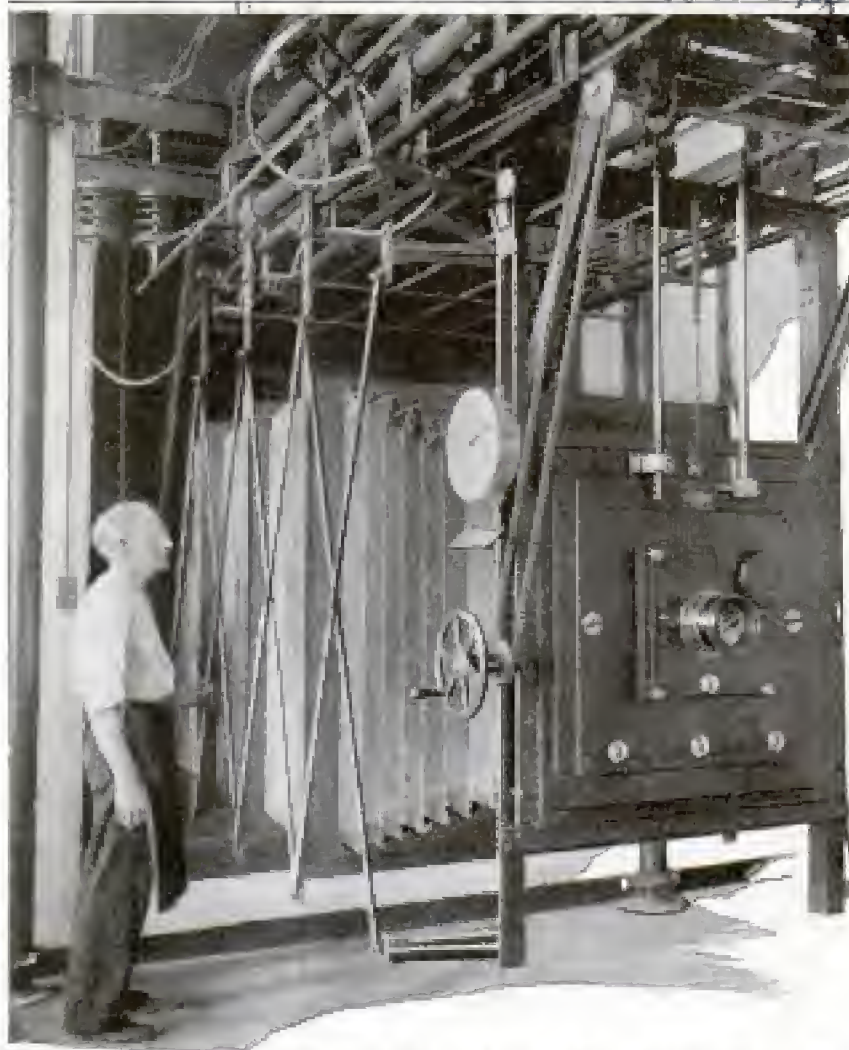
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Map Making on a Large Scale Is Possible with This Camera Which Produces a Picture 200 Times the Size of a Kodak Print

THREE-TON CAMERA FOR MAPS MAKES U. S. ATLAS

Designed to aid in making the topographic atlas of the United States, a camera weighing three tons and producing a picture nearly 200 times the size of the average kodak print has been evolved. The necessity for the map negative to be a facsimile of the original draftsman's drawing, omitting not the smallest detail, resulted in the production of this twenty-five-foot camera by the geological survey. A massive frame supports it on springs to give greatest freedom of vibration.

TWO-THIRDS OF HOMES ELECTRIC-WIRED

Two-thirds of the homes in the United States are wired for electricity.

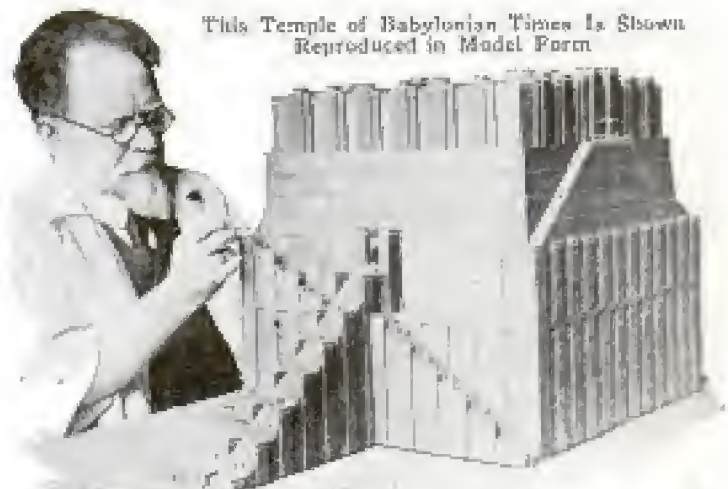
The first count of its kind shows that 20,049,450 of the 29,980,146 homes in the country have power and light connections. New York leads with 2,999,784, Pennsylvania is second with 1,732,843 and Illinois third with 1,600,779. California and Ohio also have more than 1,000,000 wired homes. In only three states, North Dakota, South Dakota and Vermont, does the number of wired farm homes exceed that of wired city homes.

B-731 BABYLON TEMPLES SHOWN IN MODELS

Some idea of the appearance of Babylonian temples can now be obtained from models of such structures prepared from plans made by those who have examined the ancient ruins. A model of one of them has been made in Berlin for Prof.

James H. Breasted, of the Oriental Institute of the University of Chicago. It is estimated the original structure was about 300 feet high. The model shows the temple resembled a modern office building in exterior appearance except that outside stairways were used instead of elevators.

This Temple of Babylonian Times Is Shown Reproduced in Model Form



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B-10

Electrical Equipment
U.S. Dept. of Commerce
Washington D.C.

Constructed from plans by
late Prof. H. J. S. S. S.
Ernst Stegemann

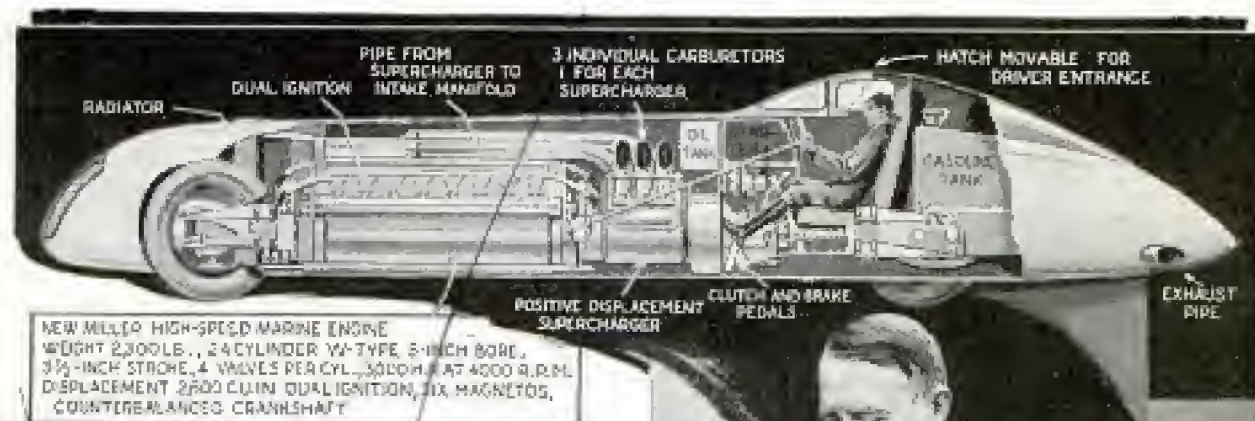
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B 873

Harry A. Hughes Inf.
 Co. 2652 Long Beach
 Ave. Los Angeles 181
 Calif

POPULAR MECHANICS

Six Miles Per Minute Seen by Master Driver



By BARNEY OLDFIELD

As told to Derek White

*150 W
 Included Are. Detroit
 Much*

TWENTY-TWO years ago, at Daytona Beach, Fla., I broke the world's straightaway automobile-speed record by driving a Blitzen Benz at the rate of 131.75 miles per hour. This winter I am going back to the same beach and break the present world's straightaway record, now held by Sir Malcolm Campbell, and bring it back to America. Harry Miller, of Los Angeles, is building my new car—a 3,000-horsepower hurricane that is geared to do six miles a minute. I haven't driven a racing car since 1920, but that doesn't mean I can't drive. I am fifty-four years old and have been racing for thirty-eight years. Is that too old? Sir Malcolm Campbell is over forty-eight. My health, and my eyes and my nerves are as good as ever. Judgment, more than anything else, will break the record. Given a car, properly powered and engineered, it is entirely a matter of picking exactly the right time and the right conditions for the attempt. I'm betting on my judgment in this case. I'll have a car every bit as good as Sir Malcolm's, if not better.

What is the object of trying to shatter every record as fast as it is established? Progress, that is, the development of faster means of transportation for everybody.

When we have the super-highways built that are now planned, we will tour at 100 miles an hour—perhaps at greater speeds—so we must continue to push up the speed



Barney Oldfield with Model Car, Shown in Diagram Above, in Which He Hopes to Break World's Speed Record

record with special cars so that tomorrow all the world may attain tremendous speed with safety.

My new car is somewhat similar to Campbell's "Bluebird," except the engine design and power output. The British car weighs 8,000 pounds, while mine will weigh but 6,500 pounds. My car is fifteen and one-half feet long and will be minus the huge fin with which Sir Malcolm stabilized his craft.

The fin will be unnecessary, because the Miller special has four-wheel drive, whereas the "Bluebird" drives from the rear wheels alone. Wind-tunnel tests have determined the efficiency of my design, which is, in general, cigar-shaped.

The engine will have three banks of eight cylinders, each operating on a single crankshaft and driving through two transmissions to the front and rear wheels. The maximum of 3,000 horsepower will be

(Continued to page 122A)

B 820 d no Mrs. Ellinghausen,
an engineer, Bremer
POPULAR MECHANICS
Germany

182

Air-Propelled Glider Boat Will Carry Sixty



How a New-Type German Boat Will Glide across the Atlantic; Note the Fins That Raise the Craft Out of the Water, Increasing Its Speed

Accommodations for sixty passengers will be provided in a German glider boat driven by air propellers. Successful operation of a small boat of this type has resulted in plans for constructing a craft big enough to speed across the Atlantic in safety. Pontoons attached to each side keep the boat upright in heavy seas, while a set of fins or water wings on each side helps raise the boat's nose in planing fashion, resulting in greater speed.

FIREPROOF GLOVES OF COTTON RESIST HOTTEST FLAME

Cotton gloves that will not burn have been produced by treating the fabric with a chemical. A pair of common gauntlet gloves, after treatment, will protect the wearer's hands many seconds in the flame of the mechanical torch before they heat through. Even then, the cloth does not burn. Cedar shingles treated in like manner resist flame which melts ordinary metals held against the wood. In addition, the fireproofing chemical fills the cellular structure of soft woods, giving them a hardness comparable to that of most hardwoods. Timbers can be made termite-

proof by this treatment, as has been proved by an eighteen-month test of wood piling in teredo-infested tidelands.



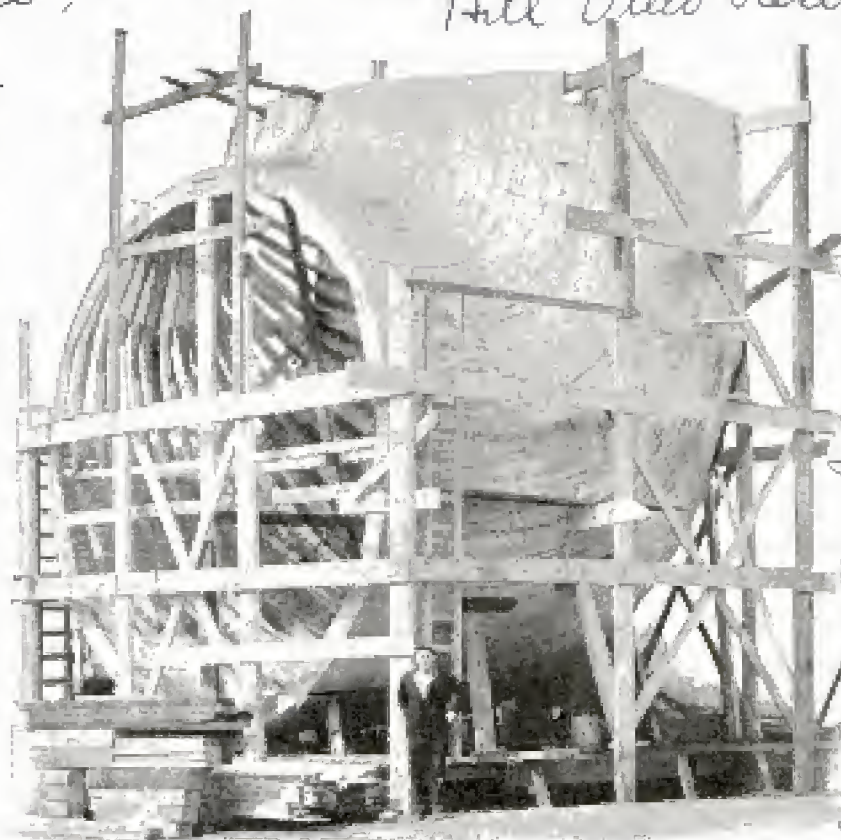
You Can Hold Your Hands over a Blowtorch Flame if Protected by These Fireproof Gloves

d no Mr. W. E. Hodnefield,
710 W. P. Storey Bldg
Los Angeles
Copyright material

Has Kitchbach, 5
Schwarzhofergerstr.
Berlin - Germany
Amb.
395 S. Raymond
63 Ave.
Los Angeles
6/19
see July 1933 (28)

Watson Lewis,
Managing Editor
Science Service
STARS LIGHT SIXTH
OF SKY ON CLEAR
NIGHT

B. 857 New York City Water
Tunnel at
Hill View Reservoir



This Wooden Form Is Used in Setting Concrete for a Water Tunnel; Note Its Size, as Compared with That of Man

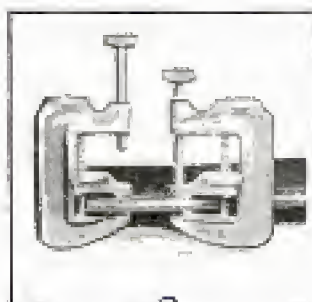
LONGEST TUNNEL FOR WATER DIPS FIVE HUNDRED FEET

Concrete for New York's water tunnel will be poured around a huge wooden form 500 feet below sea level. The form, in the shape of an elbow, weighs several tons. After one elbow has been allowed to harden, or set, the form will be taken down in sections and reassembled at the foot of a similar shaft for another elbow. The form, twenty-one feet in diameter, is one of the devices used in building the twenty-mile tunnel, said to be the world's longest. Daily capacity of the tunnel will be 700 million gallons.

Cont. Spencer A. Jones,
133 Academy St.
Burlington, Vt.

C-CLAMP HAS TENSION SPRING TO MAKE WORK EASIER

Its sliding jaw fitted with a coil spring to hold the work, a C-clamp that is easier to adjust has been produced. The spring holds the work in place, permitting adjustments before the screw is tightened. The clamp is easily attached with one hand.



RUBBER TILES FOR SHIP DECKS GIVE SURE FOOTING

Replacing the traditional wood decks, rubber tiles used on the French liner "Charaplain" are slip-proof. The ship also has discarded deck ventilators, a large single smokestack carrying air to and from all parts of the vessel. This provides additional lounging space, and affords an unobstructed view of the ocean.

no further
data

Barton Mfg Co
2701 S. 6th St. Court
Cicero, Ill.

Cont. Jacob Heschel
1510 72nd St.
Bronx, N.Y.

Science Service 6/1/32



This Form of Rail-Car Is in Use Where a Bridge Was Washed Out; It Is Pulled by Strap Iron Shown Hanging from the Cable

CAR RUNNING ON CABLE SERVES AS BRIDGE OVER CANYON

When spring freshets tore out a western bridge spanning a canyon leading to a mountain cabin, the owner substituted a monorail car propelled by hand. The car travels on a wire cable and is propelled by a length of pipe with a strap-iron extension that grips the cable, allowing the passengers to push the swinging conveyance in either direction.

AIR TRAVEL ALMOST DOUBLED BY INCREASED SAFETY

Air travel for the first four months of 1932 was almost double that of the same period in 1931, while mail planes carried increased poundage. The United States post office department attributes these gains to increased confidence in the safety of air mail and passenger planes. On some routes, more women than men have been flying regularly, a sign that passenger traffic probably will grow abnormally. On most routes, fast, dependable and spacious planes are in operation. Accidents have been few and fatalities fewer, increasing public confidence so that the air, one is accepted as a medium of transportation that is safe and speedier than any other form of travel. For the first four months of 1932, 73,797 passengers rode the nation's air-mail routes, compared to 39,639

in the corresponding period of 1931.

B1064 AIRPLANE PILOT RACES PIGEON IN TEST

Pitted against homing pigeons, nature's own flyers, an airplane pilot won a seventy-mile race that tested his sense of direction, an essential part of every pilot's equipment. The pilot and the pigeons were taken to the starting point in a closed automobile, so that all flying would be "blind." The pigeons were released and the plane took

off without a compass. While the pigeons were making for home in a straight line, the pilot had to get his bearing. Soon, he saw a familiar landmark and as a result, he beat the fastest pigeon home by fifteen minutes.

B927 AUTO'S STEERING GEAR TESTED IN TEN MINUTES

All the steering parts of an automobile now can be tested simultaneously with the aid of a checking apparatus that embodies all the necessary devices, thus enabling a complete test in less than ten minutes. Checking of caster, camber and other factors formerly has been done with individual tools, with the result that a much longer time was required for the job.



Placed on This Testing Device, Every Part of Auto's Steering Gear Can Be Inspected Quickly

Cont. Shop. & Simmons, Jr.
145 S. S. & Spring St. Los Angeles

U.S. Daily
6/20/32

Carl B. Wadsworth,
Supt. Div. of Air Mail
Post Office Dept. Washington
Oress Mfg. Co.
Dayton, Ohio

American Road Builders Assn.

National Press Bldg. Washington, DC
HOW QUICK YOU STOP
YOUR CAR INDICATES
SAFE SPEED

If you want to drive sixty miles an hour, keep 233 feet behind the nearest car. That is the advice of experts who have compiled a table of stopping distances to increase the safety of autoists. The stopping distances are based on a single ten-foot lane where drivers are not allowed to pass the car ahead. The table of speeds and safe margins between autos shows: thirty miles an hour, seventy-one feet; thirty-five miles an hour, ninety feet; forty miles an hour, 113 feet; forty-five miles an hour, 138 feet; fifty miles an hour, 167 feet; fifty-five miles an hour, 198 feet, and sixty miles an hour, 233 feet.

BIKE ON MONORAIL SPEEDS SHIPPING

Heavy merchandise can be moved about in warehouse or shipping room by an air cycle, equipped with block and tackle, that is operated on an overhead monorail system. One man provides the power.



This "Bicycle" on Overhead Rail Lifts Heavy Merchandise in Warehouse

Louden Machinery Co
1119 Broadway
Fairfield, Ct. Conn.

Hydraulic Elephant Power Co B831
Chicago, Ill.

POPULAR MECHANICS

Washington, DC

185
Wardhouse Ref Co
156 Chamber St
New York



Throwing a Torrent of Water in Every Direction, This Hose Can Be Pushed into Flames; No Operator Is Required

REVOLVING HOSE FIGHTS FIRE WITHOUT FIREMEN'S AID

When the flames are too hot for firemen to enter, a revolving hose that requires no operator can be pushed into the midst of the fire and a torrent of water released. Set into a frame that holds it off the floor, the hose throws water in every direction. It can be lowered through a hole in the roof, pushed through an opening cut in the floor or dropped through a window.

AUTOMATIC ENGINES ON GUARD AGAINST STORM WATERS

Standing guard at an underpass in Baltimore, automatic electric and gasoline engines keep traffic moving by pumping out storm waters. No attendant is necessary. When water flows into a storage sump of the pumping station, the electric engine is started automatically, operating on the city power supply. If the electric power fails during the storm, a gasoline-engine generator automatically starts supplying power.

Highland Pumping Station
Power Inc. Corp. W. J. B. Co.

American Road Builders Assn.
+ Hydraulic Elephant Power Co
Chicago, Ill.

Demonstrated at New York
I've kept school.

Chicago 565 W Washington

Sterling & Co. 115 h.p. engine
per minute 1000

00968

BEWARE *the* Motor

2739 S. Vermont Ave. Calif.
Los Angeles



By JOS. D. MOUNTAIN

"GIMME a quart of oil,"
"Change the oil while
you wash the car. I'll be
back later."

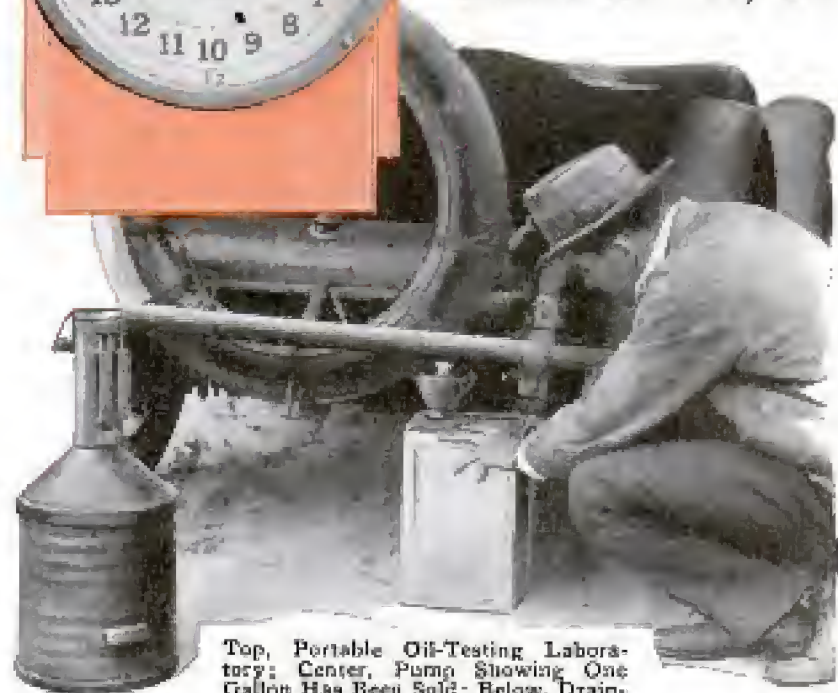
"Fill 'er up with gas
while I'm gone."

These are, in effect, invitations to unscrupulous garage or service-station attendants to "gyp" you by oil substitution, short gasoline measure, or any of the other tricks of their fraudulent games. The best way to avoid these gyps is to deal only with known service stations, backed by an organization of national reputation. This is not always possible, however, particularly when touring—then, be on your guard.

Don't ask merely for a quart of oil. This allows a dealer, if he is not honest, to put his cheapest oil into your engine and charge you for his best. The oil

he puts in may be only slightly inferior to the proper grade for your engine, or it may be so bad that it will do serious damage. A woman recently ordered oil in a roadside store in the mid-west, which, in addition to selling gasoline, motor oil and accessories, also dealt in hay and feed, paint and groceries. The attendant disappeared into the interior of the store and soon reappeared with a measureful of oil. It was oil, all right—but it was linseed oil! He poured it into the engine of her expensive car and she went on her innocent way. Later that quart of oil cost the owner a staggering bill for complete overhauling.

Don't leave your car at an unknown station to be serviced during your absence. Some stations which advertise that they will



Top, Portable Oil-Testing Laboratory; Center, Pump Showing One Gallon Has Been Sold; Below, Draining Gas from Dummy Tank

Oil Gyp!

Making a Simple Test of Motor Oils by Inverting the Bottles and Watching the Bubbles Rise; Below, Testing a Gasoline Pump by Filling a Standard Five-Gallon Can from the Delivery Hose



To Foil the Oil Cheater

WHENEVER possible, buy nationally known brands of oil and gasoline from stations of known repute.

Specify oil by name.

See that attendant gives you the kind you ask for.

Note that measure is entirely empty before attendant fills it.

Check crankcase level after each oil change.

If oil is suspiciously muddy in appearance, check for gassy odor.

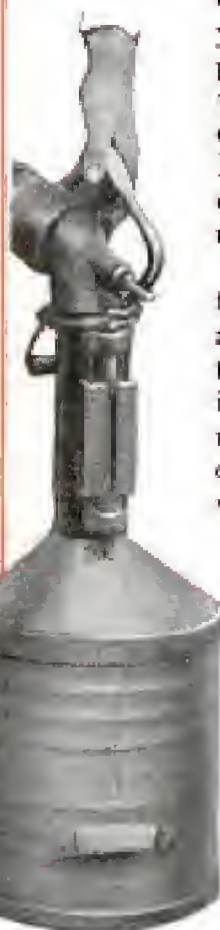
Don't assume oil to be good merely because of clear color.

Don't leave car at unknown station to be "gassed and oiled" during your absence.

See that bowl of visible-delivery type pump is full before filling car tank.

Steer clear of "big bargains" in gas and oil.

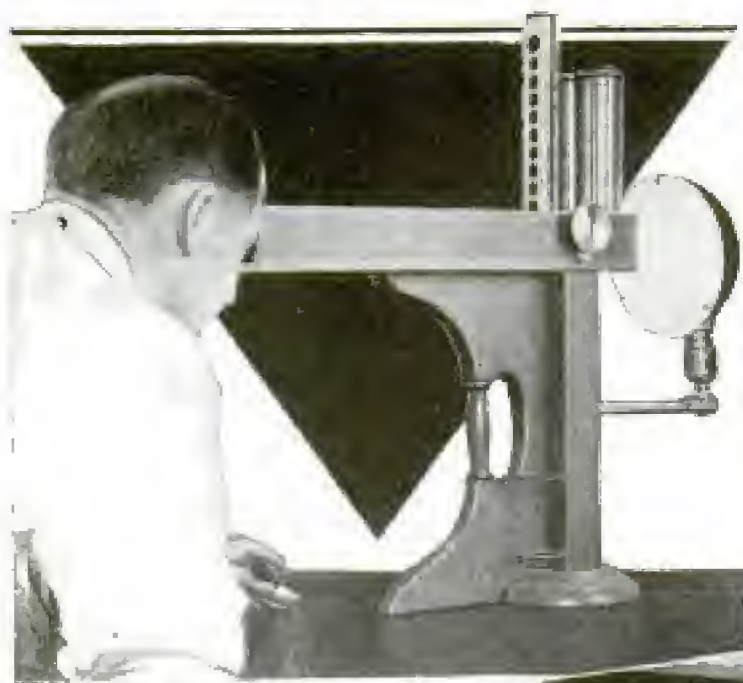
change the oil while they wash your car, deliberately use a cheap brand, if the owner is not present and watching. The most common method of oil substitution is to draw the oil out of the wrong drum. Some service stations and garages keep their oil drums in the rear, out



of sight of the customer. If you have any reason to be suspicious, follow the attendant to the drum and see that the name of the brand you order is on it. If the drum is unmarked or otherwise open to question, refuse the oil.

Another imposition to watch for is reclaimed oil. Sometimes a dishonest dealer will pour thin oil from crankcase drainings into heavy oil and sell the resulting combination as medium. This is practiced usually with dark-colored oils which do not readily reveal the blackened crankcase drainings. Generally, however, such oil is betrayed by its gasoline odor—resulting from the dilution of the crankcase oil during previous use. On the other hand, do not assume that oil is pure and of good quality merely because it is light in color.

Some crooked dealers al-



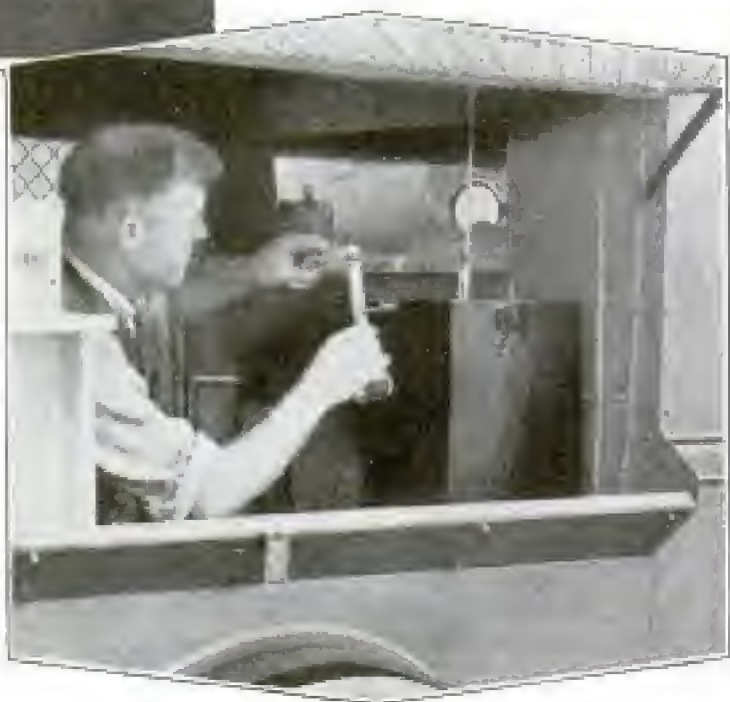
Above, Comparing Samples of Motor Oil in Colorimeter; Right, Preparing to Distill Gasoline Sample in Portable Laboratory

ter their oil measures by putting in false bottoms. This is not common, however, because it is so easily detected by the inspectors of weights and measures. A ruse, more difficult for the inspector to uncover but easily checked by the wary customer, is perpetrated by leaving the oil measure about half full of inferior oil. When the next customer orders a high-grade oil, the dealer fills the measure with the kind ordered. If the cheapest oil is demanded, the dealer has not lost anything. If the motorist orders high-grade oil and does not bother to check up, the gyp is ahead of the game. See that the measure is entirely empty before it is used to fill your crankcase.

"But not always does the customer lose by substitution," E. B. Henderson, deputy sealer of weights and measures of Los Angeles county, told me. "Recently we were puzzled by tests of samples of the oil which one service station in Pasadena was selling under the name of a well-known brand. The characteristics of the sample were very similar to those of the true oil. In fact, all our tests indicated that the oil he was selling was a little better than that he advertised. We eventually found that

he had purchased a lot of oil from a company that had failed. Because of the unpopularity of this brand brought on by the failure of the company which made it, this dealer sold it under the more popular name, even though it was a slightly better oil."

Only laboratory tests can determine positively whether a given sample of oil conforms strictly to the specifications of the brand name under which it is sold. In the laboratories of the department of weights and measures of most states, chemists make tests of all the characteristics of motor oils



and gasolines in order to detect substitution. Specific gravity, viscosity, color, pour point, and the flash and fire points are used as identifying characteristics. These and other properties of the oil under test are carefully compared with characteristics of the known oils.

This laboratory often is carried on a motor truck, so that the chemist and inspector can drive into a station, test the products offered for sale, and, if found not up to legal standards, they may seal the tanks before any change in the products can be made.

Even the motorist can make a few simple tests that will detect any radical de-

parture from the standard set by the manufacturer. Secure, from a reliable source, a true sample of the oil you wish to use and carry it in a small clear bottle. Before you purchase a new supply of oil, at an unknown station, compare it with the original sample by filling a second bottle, identical with the first, with the oil you wish to test. Leave a little air space in the top of each bottle. Now, when you turn the bottles upside down—stoppered, of course—a large bubble of air will move slowly toward the uppermost part of the bottle. If the two samples are



Above, Testing Viscosity of Motor Oil; Left, Don't Buy from a Bowl Not Completely Filled



the same, the bubbles will rise exactly together. After the bubbles have risen, a drop will form. After a time, depending on the viscosity of the oil, the drop will drip off the bottom of the bottle. This test gives a rough indication of the viscosity of the oil. This is the best characteristic to decide whether two oils are the same kind and grade. But, be sure that both oils are at the same temperature. While you have the samples in your test

bottles, look through them toward a strong light and compare their colors.

"Beware of the extremely cheap oils, and of the oils which are sold as 'just as good' as certain specified high-grade oils," advises sealer Henderson. "If a refiner has to use other means to sell his oil, he at least has no confidence in his own product.

"An old gentleman of my acquaintance had a car of which he was inordinately proud. One time, a glib salesman sold him a batch of oil which was supposed to be exactly the same as the well-known brand the old gentleman had used for years. In fact, the salesman swore that it was actually from the same stock as his pet brand. My friend was finally persuaded. He drained his engine, refilled it with his bargain oil and started on one of his frequent trips into the desert. About twenty miles out, the car stopped—'frozen' solid.

"The next day he brought me a sample of his bargain oil. I put it through our regular tests and found that he had been duped into buying 'still bottoms,' the residue which is left in the refining still after all usable gasolines and oils have been boiled off. This is usually sold as fuel oil at a very low price. It has no lubricating

Tank Trucks Are Tested for Capacity Before They Go Out; Here Is a 3,000-Gallon Truck Being Calibrated; the Standard Tanks in the Background Will Measure the Volume of the Tank Truck to a Fraction of a Gallon



value at all. Yet in one sense the salesman had not lied; it may have been from the same original 'stock' as his favorite brand—but what a difference!"

Remember, also, that the geographical location of the oil well is no guarantee of good oil. Merely because a certain oil comes from a field in the same state as an oil of known quality is not enough. Refining methods are much more important than mere location of the well.

The motorist should also take precautions against being gypped when he buys gasoline. The most common form of gasoline gyp is the short-measure racket in which the customer pays for more gasoline than is delivered to his car. This gasoline short-changing is performed in various ways. When the old-style lift pump is used, if the gasoline level is low in the storage tank, the pump will deliver part gasoline and part air. But with the modern visible pumps which have a ten-gallon glass bowl from which the gasoline is delivered, the customer can see how much he gets.

Be sure, when buying gasoline from a service station using this type of pump, that the bowl is full before the delivery is

started. One of the commonest methods of gypping the customer, is to leave the bowl down one gallon, as if a single gallon had been sold and the tank had not been refilled. If the customer complains, the attendant discovers his "mistake," rectifies it, and everyone is happy. But the Los Angeles county inspectors have a way of catching these culprits.

"We drive into a station and order five gallons of gas," one of the inspectors said. "The tank on the rear of our car is a dummy, not connected with the engine. We pay for the gas and get a receipt showing the number of gallons and the price. Then we drain the gasoline out into a standard five-gallon container. Often we find it short one and sometimes two gallons.

"Recently we had a most amusing case of this kind. We had completed our purchase in the usual way and had gone inside the station to give the owner a summons to trial. The attendant who had sold us the gas, thinking we had gone, came in and said joyfully to the proprietor, referring to our purchase, 'I stuck them for a gallon.' The effort made by the owner to quiet his helper was almost pathetic. When we presented our credentials he even protested. 'That boy doesn't work for me, I don't even know him.' Both the owner and his salesman were convicted of fraud."

The visible-delivery-type of pump has a by-pass valve which empties the bowl back into the storage tank. Some gasoline crooks will lean against the button which controls this valve while they are putting gas into your tank, thereby letting part of the gas for which you are paying, drain back into their storage tank. One pump had all the paint worn off around this button. Another enterprising station owner, in order to prevent detection of his gyp, ran a wire from this by-pass valve into his station, where it was operated by a second individual. A customer, knowing that his tank was nearly empty, ordered fifteen gallons of gasoline. Seeing that it did not fill the tank, he said,

"Better fill'er up." They put twenty-two gallons into that eighteen-gallon tank, he reported, but when he protested, they "called it square" when he paid for fifteen.

Another method used to gyp the gasoline buyer is to adulterate the gasoline in one way or another. In California, and some other states, the gasoline dealer is required by law to label the pump and filling pipes with the brand of the gasoline it contains. But this does not prevent some greedy dealers from substituting cheaper grades. One inspector checked the invoices from the company whose brand name was displayed on the pump, then read the meter on the pump. During the period of about one month, 2,500 gallons more gasoline had gone through this pump than the invoices showed. When accused of substitution, the dealer confessed. The cheaper gasoline had cost one cent per gallon less than that which he was advertising. During the month, he had saved about \$25 by his crookedness. He was fined \$50.

"We prosecute three to four cases a week of oil or gasoline substitution, or short measure," Mr. Henderson says. "Although this shows that there is much of it going on, the motorist can usually avoid it if he will watch his step."

MOTORS SPEED UP CAVALRY IN ARMY MANEUVERS

Increasing efficiency by speeding up army maneuvers, the cavalry of the United States army has climbed into motor trucks for faster transportation. Five horses are carried in each truck, while six trucks transport a platoon.



Cavalry Horses Are Loaded onto Trucks and Quickly Carried from Place to Place in Army Maneuvers

By Tapping Head of Rake Lightly on the Ground. This Attachment Pushes Leaves off the Teeth; Boy Is Holding Rake in Cleaning Position; Grass or Weed Cutter Also Is Shown

grass cutter \$3.75 up
rake cleaner 85¢

85¢



RAKE IS MADE SELF-CLEANING BY SIMPLE ATTACHMENT

Teeth of the garden rake can be made self-cleaning by a simple attachment that fits on the handle and over each tooth. By reversing the rake and pressing down on the tamping plate of the attachment, the teeth are drawn through a slotted band that throws off all grass, leaves and rubbish, eliminating the need of pounding the rake to shake them loose.

POSTAGE STAMP WORTH MORE IF IT'S IMPERFECT

Imperfections make some United States postage stamps worth considerably more than their face value. When a small perforating machine in the government printing office made an error in the two-cent Von Steuben stamps, a rarity resulted. High prices are being offered for these stamps without the usual perforations, caused by the perforating machine "skipping" or by a clerk failing to run a few sheets of stamps through the machine. About 300 of the imperfect stamps were issued.

Cent. Wm. Allen Ward
Box 4282 Station
A. Dallas Tex.

Tru. Kurl Tool Co. St. Los Angeles Calif
117 W 9 St.

Capt. Jerome S. Henry, El Paso, Texas
3717 Chester St.

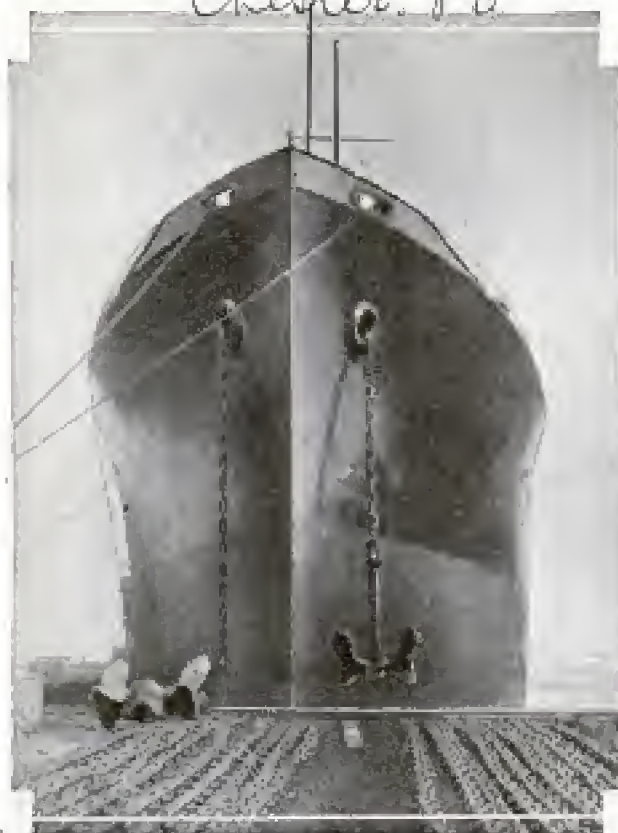
at Fort Bliss, Chas

B 1010

192

Baldt Anchor Co.
6th & Butler Sts
Chester, Pa

POPULAR MECHANICS



Weighing over 30,000 Pounds, Anchors Like Those Above Often Are Lost by Ocean Liners

FISHING FOR LOST ANCHORS IS STRANGE INDUSTRY

One of the strangest industries that has grown up around large harbors is that of fishing for anchors lost from ships. Old sea captains, and other men who have followed salt water, watch closely for liners that lose their anchors and fish for these immediately the ships depart, for the greyhound of the sea must sail on schedule with the tides. So valuable are these anchors that ships often mark the place where they lose them on their charts, and engage salvage companies to recover them. Contrary to general belief, it is not at all uncommon for a ship to lose an anchor, for the strain upon it and the chain is at times irresistible. While modern science has eliminated most of the hazards of the sea, vessels must still heave to when mountainous waves and howling winds put too great a strain on the hull for continued headway. Lacking sea room, there is only one thing left for a vessel to do—drop its heaviest anchors. Despite all modern devices for ship safety, the anchor is still the emergency brake, and the safety of hundreds of thousands of lives

depends upon them. Ships must carry more than the two bow anchors so familiar to all. It is not generally known that the modern 10,000-ton ship must carry a "suit" of five anchors—two bowers and a spare, weighing about five tons each, a stream anchor, somewhat lighter, and a kedge anchor for the stern. The "Leviathan" carries three anchors, which, with chains, represent a value of nearly \$50,000. It will, therefore, be seen that this curious fishing is a lucrative business.

NOVICE SAVES SPINNING PLANE AFTER PILOT FAINTS

When the pilot of the navy plane in which he was riding became ill and fainted, Corp. Hilmer N. Torner, of the marine corps, brought the ship out of a spin and made a creditable landing, although he had never touched the controls before. The ship was 2,000 feet up when Sergt. Orlo S. Hoffer, naval aviation pilot, collapsed. The plane, entirely out of control, started spinning toward the ground. Pulling the pilot from the controls, Torner righted the plane just before it reached the ground and sent it climbing to a high altitude. After fifteen minutes of experimental flying to learn how the controls worked, Torner brought the ship down. For his action, Corporal Torner has been awarded the Distinguished Flying Cross. He is an operations clerk attached to the naval air station, San Diego, California.

Navy Press Room. 5/27/32

PHONOGRAPH IN CAMERA CASE HAS CLEAR TONE

Built into a camera case for easy carrying, a portable phonograph that plays any-size record with a clear tone has been produced.



Motor, crank handle and reproducing arm fit into the case, which is designed like the ordinary kodak. The case acts as a sound box. After playing, the phonograph folds up like a camera.

Abercrombie & Fitch
Madison Ave + 46th
New York City

Cont. Pres. H. E. Edwards.
2047 N. Park Ave
Chicago

*Cont. Christopher & Company
 40. Ave
 New York City
 Tel. 37
 411 2nd St.
 Wash. D.C.*

*Factor upst. 111
 37
 411 2nd St.
 Wash. D.C.*

*Gloster Aircraft Co
 Sunningend Works
 Cheltenham, Eng.*

B 824

POPULAR MECHANICS

193

**PURSUIT AIRPLANE
 FIRES SIX GUNS
 AT ONCE**

Great Britain is now testing a pursuit biplane equipped with six machine guns, all operated simultaneously by the pilot. Two are mounted in blast channels on either side of the air-cooled radial motor in the normal way, and the others are placed, two on each side, about one-third out along the wings, one in the top and the other in the lower wing. The weapons are "coned" slightly so that the lines of fire converge at a point ahead of the craft. Any enemy craft getting into the apex of the cone would, it is claimed, be riddled with bullets and the chance of scoring a hit on craft beyond the apex is increased threefold, as the converging bullets from the six guns spread again. The wing guns are streamlined into the wings, and a speed of 200 miles an hour is claimed.

Colt Being Fed from Bottle in Front of Chart Which Shows Its Growth

*Cmd. Louis E. Reichard
 411 2nd St.
 Wash. D.C.*

**COLT RAISED ON BOTTLE HELPS
 IN FINDING DIET FORMULA**

In an effort to find the best substitute for mother's milk, a colt at a government experiment station at Beltsville, Md., is being raised on a bottle. Raising colts whose mothers die at their birth has been found a serious problem, and no diet formula has been found that has given general satisfaction. The bottle-fed colt received fifty-six ounces of a milk substitute six times daily during the first five weeks, after which the number of feedings were reduced but the bulk was increased. Once a month, the animal is led before a chart marked off in six-inch squares, and its picture is taken to provide a record of its development.

**CURVES AND ANGLES IN METAL
 CUT BY THROATLESS SHEAR**

Curves and angles can be cut in metal up to sixteen gauge in thickness by a throatless shear that is easy to operate and weighs only sixteen pounds. It will cut left or right, straight or curving, and also permits a straight cut into the metal or a cut-out of a square.

Throatless Shear to Cut Curves in Metal

**DOUBLE GLASS HAS AIR SPACE
 TO STOP CONDENSATION**

Moisture and frost-resisting, a glass designed to stop condensation is made of two pieces of glass, hermetically sealed with an air space between them. Heating costs are lessened by the glass, which reduces heat loss through windows by forty per cent. Clear vision is possible at all times. In addition, the glass serves the purpose of storm windows, providing double protection. It looks and is installed like a single glass. Outside noise is reduced by its sound-insulating qualities.

*Thermopane
 Franklin 4643*

*Wm. Kurt Hebel
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The MAN who BET



*changed & lowering
car by our Art Dept*

*1905-4 cyl.
28.32 hp
open coach price \$12000*

I AM beginning to think that it is the willingness to take the long chance—to bet on your dreams, when the odds are ten to one against you—that is the essence of the peculiar American type of success. And this genius for backing your own hunches has the same opportunity now as in pioneering days. It still can be done.

Take Walter Chrysler.

Turn the clock back twenty-seven years. It's 1905—and at the automobile show in Chicago. For four days a broad-shouldered, husky mid-western railroad man hung around a rakish, white touring car, upholstered in red leather. He couldn't keep his eyes off it; he was fascinated.

"How much did you say that car was?" he asked the salesman for the tenth time.

"Five thousand cash."

For the tenth time this railroad man walked to the far end of the great building. Five thousand dollars in cash was exactly forty-three hundred more than he had. It was five hundred more than he made in a whole year as superintendent of motive power of the Chicago Great Western Railroad company down at Oelwein, Iowa.

Of course, it was a silly thing to do, but he had a hunch. All right! Walter Chrysler would bet on his hunch. He'd back

his dream and put up a year's work as a mortgage!

His grandfather had been a covered-wagon man, his own father was a railroad man, and he was going to be an automobile man—it was in the cards.

That night he telegraphed his bank to wire every cent of his balance of \$700 to Chicago. The following day he visited several big railway men who were his friends. He made pledges and signed notes, and late that afternoon he hurried up to the automobile show and to the big white car with the red-leather trappings.

"I'll take it," he said breathlessly. "I've got the cash. Ship it down to Oelwein, Iowa, for me."

A week later the car arrived. Walter Chrysler had a friend drive it up to the barn in the rear of his home. That was as much as it was driven right then. Immediately the barn was turned into a workshop and every second of his spare time Walter spent in tinkering with his car. His wife quite rightly had some things to say about this wild extravagance. Any-

on HIS DREAMS

By FRAZIER HUNT



way, why not ride in the car? But most of the time for the next three months it was knocked down. It was the best automobile built in America at that time, but after he'd taken it apart and put it together three or four times he could have built a better one himself. And he had a better

name for this dream car, too—he'd call it the Chrysler.

Nineteen years were to pass before his dream came true. That's quite a long time to wait before you cash in on your bet. And this was a hundred thousand-to-one shot—but Walter Chrysler won.

He had come from real pioneer stock. His father was a French Canadian boy who had immigrated with his folks in a covered wagon to Kansas. When the Civil War swept through the country, this boy—the father of our car dreamer—enlisted in a Kansas regiment as a drummer boy. With the war over, he fell in love with a Kansas-born pioneer girl.



In 1873, a boy was born to this drummer boy and his girl wife. They were living at Wamego, Kans.,—at that time the end of the Kansas Pacific railroad. The once drummer boy was now a locomotive engineer and following the railroads that swept on their magic trail westward across what had once been the great American desert.

This boy, Walter Chrysler, grew up under the spell of the restless, dynamic, imaginative west. Transportation, speed, movement, were in his blood. And more, he liked to make things with his hands. He liked to think with his hands. Naturally the railroads called him.

At seventeen he entered the railroad shops at Ellis, Kans., and worked four years before he became a full-fledged journeyman mechanic. Then he started to wander—searching, dreaming, for some idea that he could plunge headlong into.

With a bang he bumped into the automobile idea. Already the "horseless carriage" was beginning to dominate the thought of imaginative transportation engineers. It was new and undeveloped; its

future was all in front of it, and from the very first sketches in engineering papers that this young Chrysler's eager eyes discovered, he sensed instinctively that some day he'd build motor cars. But he'd have to know all about men and manufacturing first.

For several years he moved from one railroad shop to another, searching out



more and more experiences. One day he heard that in the Santa Fe shops in Topeka, they were actually building locomotives. He hustled over there and got a job—leaving as soon as the engines were built. Finally he became a roundhouse foreman in the Rio Grande western shop in Salt Lake City. Now he took enough time off to hurry down to Ellis—and came back with his bride.

At thirty-three he was made superintendent of motive power of the Chicago Great Western railroad; and this was his job when he bought in Chicago that big white car with the red trimmings. He'd been taking a home-study course and dreaming incessantly about motor cars. He had faith that they would be the answer to the transportation problem of the future, and he was willing to risk anything

on this faith of his. He'd go as far as betting \$4,300 of borrowed money on it.

It took about all he could save the next three years to pay off that debt, and then one day there was a disagreement over policies in the shop and he resigned.



Immediately he telegraphed the president of the American Locomotive Works for a job. The next day a wire came saying to be in Pittsburgh on a certain day. He was there all right—even if, for the first time in his life, he had to buy a railroad ticket to get there.

The president offered him a position as shop superintendent—and he accepted before they'd figured out the salary. What he was after was manufacturing experience. He was still dreaming of the day when he'd be making motor cars—preparing himself for this "der Tag" of his own.

True to Horatio Alger, within two years Chrysler had fought his way up to the job of general manager of the great locomotive works at a salary of \$12,000 a year. He was a "big shot"—but he couldn't get his mind off motor cars. When he was



away from the works he didn't want to talk about anything else. He knew it was only a matter of time until he'd be making them.

The big chance came quicker than he had figured on. The eastern bankers controlling General Motors had selected Nash to head the great corporation, leaving a vacancy in the Buick unit. The bankers had heard of this Kansas cyclone, and they suggested to Nash that Chrysler would be the best man to replace him in Buick. Nash got in touch with Chrysler and the two met in Pittsburgh.

Nash didn't have to work very hard to sell Chrysler the idea. He'd sold it to himself way back in Iowa.

"It sounds about what I want," Chrysler said; "I'd like to tackle the job."

He'd start in as works manager, Nash told him. "How much money do you want?"

"I'm making \$12,000 now," Chrysler replied.

Nash shook his head. "We're not paying anything like that in the automobile business."

"How much will you pay me?" Chrysler demanded.

800
- 198



"Six thousand at the most," Nash replied.

"I'll take the job," Chrysler fairly barked back.

He was really started now—started making good on the dream he'd had so long before.

Down in the Buick plant they still talk about how Chrysler worked those first months he was on the job. Any hour of the day and night would find him in the shops. He was an expert mechanic himself and there wasn't a job in the whole great factory that he couldn't do as well as, or better than, the expert doing it.

Almost at once he started improving the Buick; that particular model was having some axle trouble. Chrysler diagnosed the case immediately and ordered that heat-treated axles replace the cold-rolled ones. Then he worked wonders in the body. In place of all-wood bodies, he designed a composite wood-and-steel one.

He dreamed all the time—and he worked most of the time. Within two years he had jumped from works manager to the presidency of the Buick company and the first vice presidency of General Motors, in charge of production.

In November, 1919, nine years after he had come to the General Motors company,



he resigned. He was comfortably wealthy; he had good health, ambition and a knowledge of the motor car business second to none in America. And he still had his big dream left—his big idea.

Before he could take a decent rest, the bankers shunted him into the difficult task of cleaning house for the Willys-Overland company. Then, in the midst of this, he was asked to

shoulder another difficult proposition—to save the Maxwell from complete disaster.

There were twelve million dollars worth of bad loans and a total indebtedness of twenty million. Chrysler rolled up his sleeves and set to work. He reorganized the sales department, and then did the thing that he'd been waiting nineteen years to do—designed his own motor car and named it after himself. It was the sensation of the 1924 New York show. Then he reorganized the company and called it the Chrysler Motor corporation. That first year he sold 137,668 Chryslers.

And if that isn't making a dream come true, you'll just have to pardon my glove.

Service Service 5/10/32

S. K. Wolf and J. E.
Sweetdale
Electrical Research
Products, Inc. 9/10 S. Michigan Ave
CHICAGO
B 936

POPULAR MECHANICS
CHICAGO

199

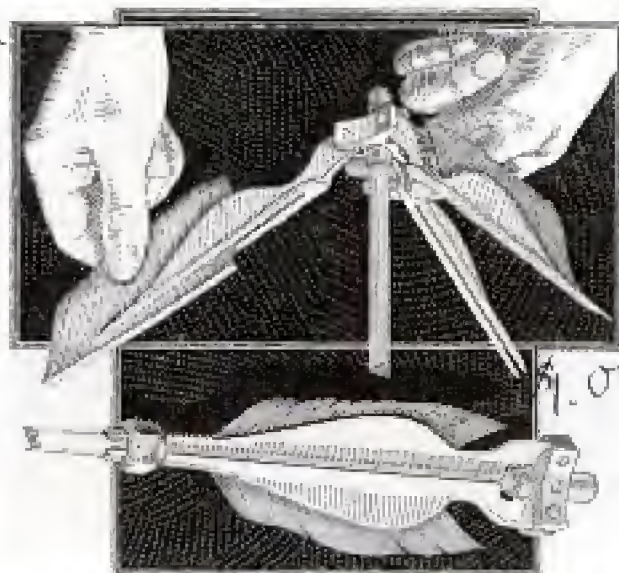
**THEATER CROWD'S NOISE
TOO LOUD FOR
CONTROL** B 952

Too noisy to be controlled by engineering devices, the average theater audience sets itself as the limit to which a building can be soundproofed. It is possible to treat other noise-sources by properly insulating walls, doors and windows, but the audience is a noise source over whose output the engineers' control is meager. The noise level of an ordinarily quiet theater is from twenty-five to thirty units above audibility, while street noise is from sixty to seventy units. Proper treatment of the theater reduces the street noise to less than that caused by the audience's chatter and commotion.

TOOL FOR FEATHERING ARROWS HELPS AMATEUR

 B 761

Helping the archer prepare his arrows at home or at his club, a tool that holds the feathers in place until the glue or cement fastens them to the arrow is now available. The feathers are spaced equally by slits in the tool and are held in line with the axis of the shaft and at right angles to the surface. All three feathers are applied at the same time.



Arrows Can Be Feathered with This Tool; It Holds Feathers in Place for Gluing



This Sleep-Inducer, with Its Low Hum, Makes the Subject Drowsy; Note the Recorders Attached to Arms, Legs and Head

HUM THAT PUTS YOU TO SLEEP COMES FROM LOUD SPEAKER

Sending out a hum like that of a distant airplane, a sleep-inducing machine has been invented and tested by Prof. John B. Morgan, of the Northwestern University. The hum comes from a loud speaker, lulling the subject of the test to sleep. Dials record each step in the process, when an arm or leg goes to sleep and when the entire body is finally relaxed. *Waiston*

GENERATOR CONTROL ON DASH SETS CHARGING RATE

 B-954

Control of the battery-charging rate is brought to the driver's fingertips by a generator control that is placed on the automobile dash. A knob regulates the charging rate to driving conditions. The control is connected to the grounded side of the field circuit and adjusts the rate by increasing or decreasing the field current. There is a range of five to twenty amperes. It is designed to eliminate the expense of recharging batteries. *Unesco \$2.50*

Archery Sales & Service Co.
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Hutchinson Corp.
1643 Broadway
Bldg. San Francisco

Tel. Walnut 5499

406 Chicago Ave.

Rec. Sept. 11 32-464

Electrical Eng. Co. Calif.

Maker - University

B. 775



Wide World

Like a Bird with Two Bodies, This Passenger Plane Has Twin Cabins; Each Cabin Has Its Own Landing Gear; Pilot's Compartment Is above the Passengers' Quarters

TWIN-CABIN PASSENGER PLANE HAS TWO MOTORS

Two separate cabins for passengers have been built into a French airplane that will be placed in regular service. The pilot's cabin is directly behind the motor gondola, while the passengers' quarters are in cabins on either side. Two 500-horsepower motors have been installed. Accommodations are provided for sixteen, including four in the crew.

BARROW INSIDE LARGE WHEEL HAULS BIG LOADS EASILY

Large loads can be hauled easily in a wheelbarrow that has its container inside of a big wheel. As the wheel rolls, the container runs on the inside rim of the

wheel, always keeping upright. One man can operate the vehicle, carrying larger loads with less effort than is possible with the ordinary wheelbarrow.

WELDED METAL MADE SAFER BY SLOW COOLING

Welded metals can be made safer and less brittle by a slow cooling process developed by Westinghouse Electric and Manufacturing company engineers. The process makes possible the welding of high-speed rotating machinery, high-pressure boilers and similar equipment. Pure iron used as welding material, while very ductile before the welding process, occasionally resulted in a brittle weld which would not bend or stretch but would snap without warning when loaded to the limit of its strength. The engineers found that nitrogen from the air combined with the weld metal to cause that brittleness. By cooling the hot weld slowly, the nitrogen is left relatively harmless. The engineers also found that when a ductile metal is bent or stretched, layers of the metal slide past each other just as the leaves of an automobile spring slide along each other when the wheel strikes a bump. Too fast or too slow cooling causes precipitation of foreign particles in the weld which obstruct the sliding layers of metal,



Rolling on the Inside of This Big Wheel, a New-Type Wheelbarrow Is Designed for Hauling Larger Loads with Less Effort

no further information

resulting in breaking without warning under load. Much trouble can be avoided by preventing the nitrogen from combining with the weld metal during welding. Chemical coatings are effective for this purpose, permitting only harmless quantities of nitrogen to enter. Now that the ductility of weld metal is assured, welds can be subjected to higher stresses and to more severe impacts than ever before.

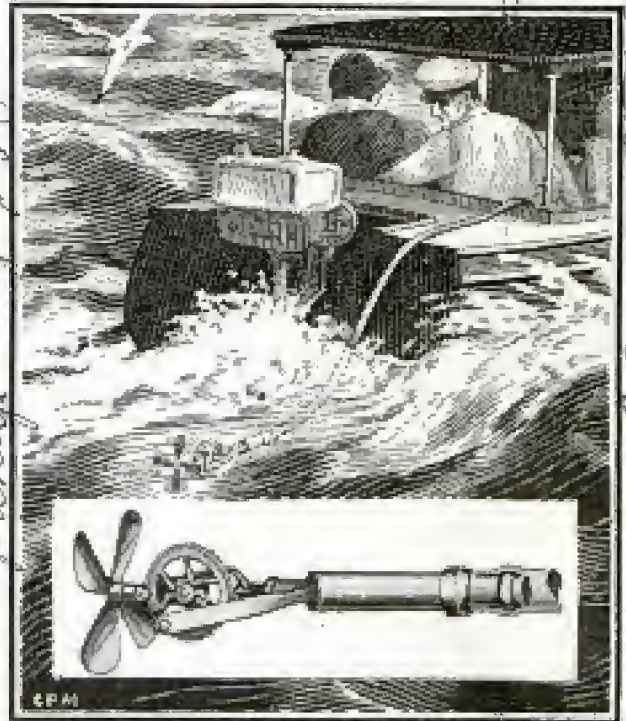
"WORLD" IN EIGHT-STORY BALL TO DEPICT PREHISTORIC AGE

Prehistoric life, with its roaring monsters, will be depicted for visitors at the 1933 Century of Progress fair by a metal globe as high as an eight-story building. Within the huge ball, mechanical beasts will roll their eyes, lash their tails, swing their heads and emit roars and squeals. These movements will be controlled by motors and a switchboard. The exterior of the globe will be covered with a map of the world, oceans appearing in silver-colored steel. At five-minute intervals, puffs of live steam will rise from the base of the ball. Lights playing on the steam at night



Prehistoric Life on Earth Is Shown by This Metal Ball, Higher Than the Average Building

will give the impression of the earth floating on clouds. The prehistoric animals will be constructed of wood, steel, canvas and papier-mache, all containing from one to sixteen motors.



Literally Pulling the Water Out of a Boat, This Bailer Is Propeller Driven

PUMP BAILS OUT SMALL BOATS ON POWER FROM WATER

Trailing behind in the water, a new pump for bailing out small boats has a propellerlike motor that sucks the water from the craft. As the boat pulls the motor, the water pressure turns the motor blades, drawing the water out of the boat through a six-foot hose. The pump operates at five miles an hour, while at eight miles an hour, one gallon per minute is bailed from the boat. The pump is portable and can be attached or detached.

SHOCK DETECTOR FOR TRAFFIC IS POCKET SEISMOGRAPH

Just how much your house is shaken by the pounding of a flat-wheeled street car or the rumbling of a big truck can be measured by a pocket-size seismograph recently completed. The instrument operates on the same principle as that of the costly earthquake detectors. A pendulum records the smallest movement of the structure in which it is placed. A beam of light acts as a pointer, registering a hair's-breadth change in the pendulum's position. For permanent record, the light registers the changes on a slowly moving sheet of photographic paper.

Completed by Frank Neumann
Seismologist, U.S. Coast
and Geodetic Survey

B 900

Jerry C. Pingel
d/o St. Louis
Tool & Mfg Co

3300 N Broadway
St. Louis, Mo

Service 5/13/32

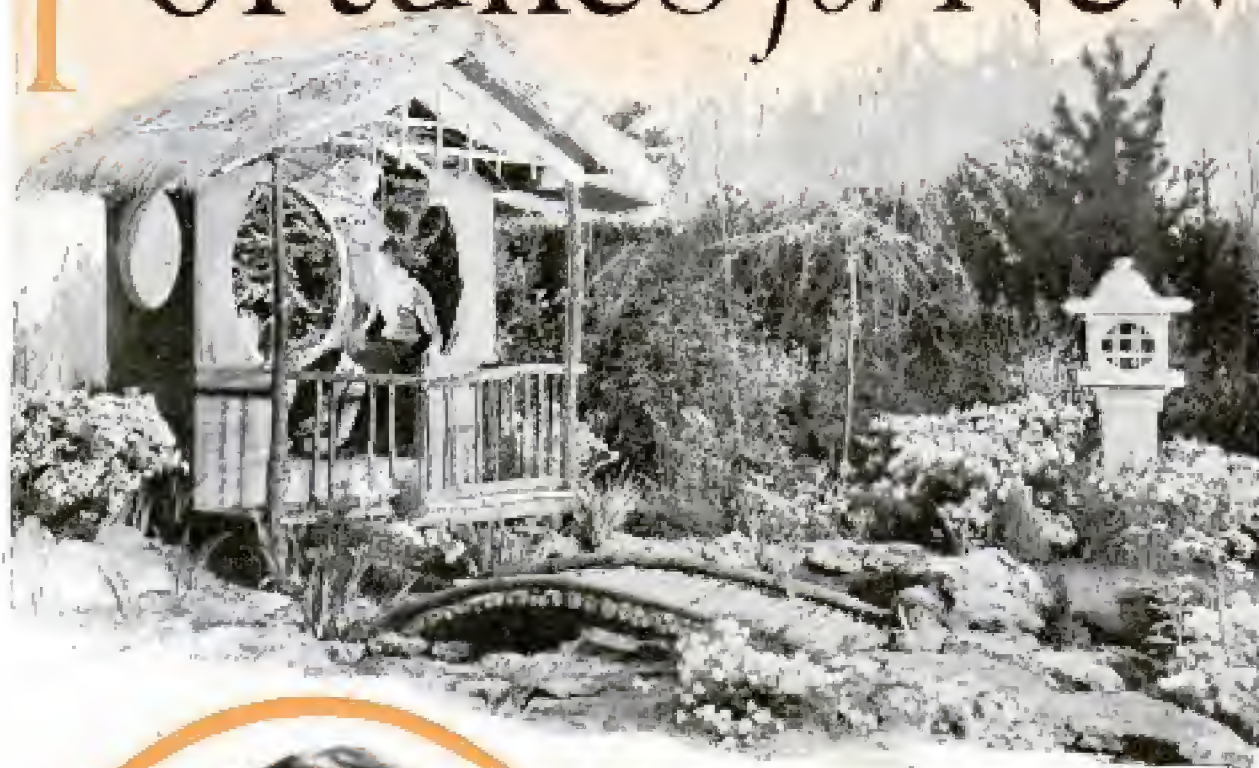
Washington
22 C

B 922

B3 792

Ant. Thomas E. Stinson, Jr.
145 S. Spring St
Los Angeles, Calif

Fortunes for New



Planting Orchid Seeds in Test Tubes Containing Agar-Agar; in This Substance the Plants Thrive during Their Early Stages

HAVE you ever seen a blue rose? Or a red gardenia? Or found a fragrant camelia? Not likely. But you probably will, if the efforts of plant breeders are successful. For these flowers are a few of the strange varieties that plant scientists expect to develop.

In the plant world men are seeking, and finding, new things under the sun. In fact, many of the present popular flowers are

new creations that were never dreamed of a few score years ago. Hybrid sweet peas are only fifty years old. Dahlia-flowered zinnias have been in existence only ten years. Fragrant double nasturtiums from seed are brand-new. Several centuries ago, there were only a few hundred varieties of roses. Today, more than 10,000 different kinds are grown.

It would be hard to predict how many new flowers will be in the gar-

dens ten years from now, but it is certain that there will be many unusual blooms. The science of hybridization, by which plants of the same family are crossed to develop new types, has made enormous strides in the last few years. Plant breeders can now plan the creation of a new variety and be practically certain of ultimate success. Years of work and thousands of experiments are usually neces-

reference. John C. Bodger,
% Bodger Seeds Ltd 3792
El Monte, Calif

Garden Flowers

sary, but often enough an amateur grower astounds the flower world with a new variety that he grew in his own back-yard garden. Many of the most desirable roses were originated by amateurs who later sold the cuttings to commercial growers to be placed on the market.

Amazing prices are paid for new flowers that take the public's fancy. Three thousand dollars a pound, and up, is cheerfully paid for the seed of some types of petunias that were created by resourceful plant breeders. The owner of a new variety can practically name his own price for several seasons.



Hybrid Aster. Above,
Bred from One Parent
with Streamer Petals
and the Other with
Tubelike Petals

Imagination, observation and patience must be practiced by the successful hybridizer, according to John C. Bodger, who, with his associates, has developed dozens of new types of garden flowers. At his experimental growing grounds, at El Monte, Calif., Mr. Bodger described the methods by which new flowers are created.

"Originating a new variety is such an exacting task," he said, "that it is well to confine your experiments to one strain. The possibilities of improvement are in-

finite, no matter whether you select a sweet pea or an orchid. First of all, you should have a definite objective in mind. You may decide that a certain variety of sweet pea having a delicately colored blossom would be more popular if it had a taller, stronger stem. The next step is to select a good specimen of the sweet pea that you wish to improve upon and then hybridize it with another variety having the desired stem characteristics. The seed from this crossing will produce all sorts of combinations of the two parent plants, and among them you should find the exact combination you are seeking. But if the experiment is apparently unsuccessful, carefully save all the seed of this generation and plant them again the next season, as the ideal plant may not appear for several generations.

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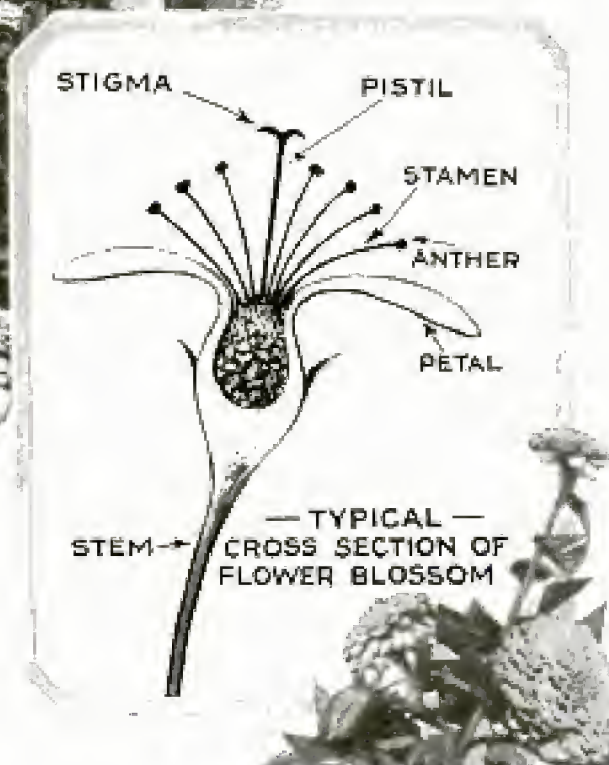
Above, Placing Screens around Freshly Hybridized Flowers to Prevent Additional Cross-Pollination

"Hybridizing, or crossing, may be used to originate varieties having new combinations or shades of color, new physical appearance, and new sizes. For instance, one of the newest hybrid varieties of asters has a head of closely bunched tubelike petals surrounded by a background of long, streamerlike petals. This is the result of a cross between two distinct varieties, one of which had a flower consisting of the long streamer petals and the other a flower made up almost entirely of the tubelike petals.

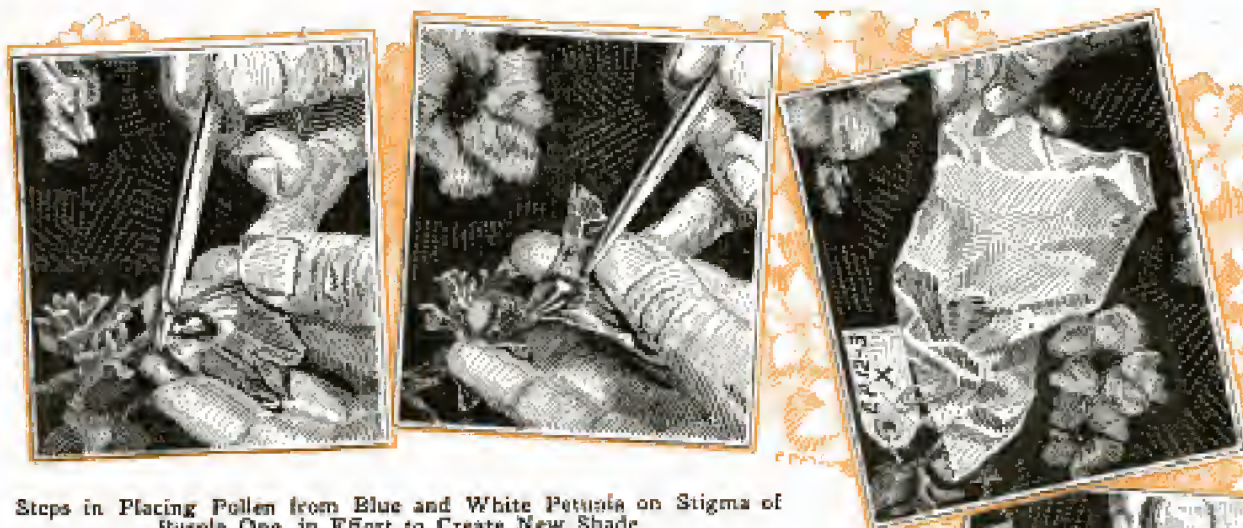
"Briefly, hybridizing consists of taking pollen from the stamens of one flower and placing it on the stigma of another flower. This is done in nature by the action of the wind and insects, but natural crossing is too haphazard for the scientific plant breeder. You should remember that you

cannot cross plants of different races. Different varieties of zinnias may be crossed successfully and a new type may be originated, but a cross between a zinnia and a rose would be a failure."

A good example of the results of scientific hybridization is the early-blooming double cosmos. The original cosmos bloomed in the autumn and had a small flower. Year after year, cosmos that had larger flowers than the average were selected and were crossed with each oth-



er until ultimately one seed, planted in New Zealand, produced a perfect double blossom. In the meantime, an early-flowering single cosmos was being developed in Germany through the same process of selection and crossing. The double cosmos was then hybridized with the early-blooming variety. Various shades of color were obtained by hybridizing with some of the original stock. The final result was a large double flower, in various colors, that



Steps in Placing Pollen from Blue and White Petunias on Stigma of Purple One, in Effort to Create New Shade

blooms early in the summer. By hybridization, the most desirable characteristics of all the parents were combined in the one plant.

"When you have decided to develop a new hybrid," says Mr. Bodger, "select a good example of the plant that you wish to improve upon and then choose a well-formed bud that is nearly ready to open. Cut away most petals so the interior of the bud is exposed. You will observe that all of the features of the fully opened flower are packed away inside the bud. The pollen-bearing stamens and the long thick stigma may be recognized at once. With a pair of tweezers or small scissors remove all of the anthers, which are the pollen sacks at the tips of the stamens. Then inclose the bud in a glassine paper bag or some other thin material so that no stray pollen from other plants can reach the stigma.

"A day or so later you will observe that the stigma has taken on a sticky appearance. When this occurs, go to the plant that you have selected as the other parent and with a camel's-hair brush remove the pollen dust from the stamens of a fully opened flower. Dust the pollen lightly over the sticky portion of the stigma that you have kept inclosed in paper. Transfer enough pollen from the other plant so the stigma is completely covered. Then replace the paper bag around the bud and keep it inclosed until the plant has withered and the new seeds are ready to gather. Keep the seeds in a dry place and plant them the next season. When the new growth matures, you will find that, if you have done the work properly, the plants will have some of the characteristics of each parent.

"Very few of the flowers will be alike, as most specimens will have different combinations of the characteristics of each parent. Select the plants that come closest to the ideal that you are seeking and save their seed and plant them again next year. Or, if you wish, you may cross the best examples of the plants again.

"The offspring from such a crossing inherit the characteristics of the parents in accordance with a complicated formula known as Mendel's law. This is to the effect that the progeny of a crossing tend to exhibit the features of the





New Hybrid Varieties of Orchids Formed by Crossing Different Kinds of These Flowers

dominant parent. When this generation is crossed within itself, some of the offspring will resemble the dominant parent and the others will favor the other parent, in the ratio of three to one. With this in mind, it is easy to realize that several generations must sometimes pass before the plant you are seeking is created."

Practically every present-day garden flower is the result of such selecting and hybridizing. In its original wild state, the rose was a scrawny bush that had only a few small flowers. The wild pea from which the present sweet pea was developed had tiny blossoms with little odor and scarcely any resemblance to the cultivated flower. Floriculturists have developed each original flower along the paths they think best. One plant is given a longer stem, another a new color, and a third a different shape of blossom.

Sometimes nature develops a new flower of its own accord. The lucky grower who finds such a "sport" carefully guards it in the hope that it will be reproductive.

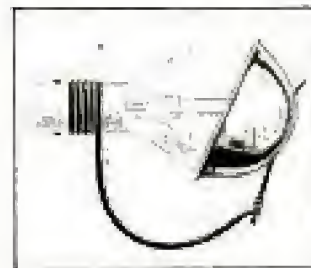
Sports, or mutations, are thought to be the result of spontaneous jumps on the part of nature over several stages of plant evolution. In such cases nature accomplishes within one season the same results that plant scientists would expect only after many years of work.

The most recent mutation of importance is the double nasturtium, which in the past has never been reproduced from seed. In examining a field of single-flowered nasturtiums several seasons ago, Bodger came across a double bloom that had apparently sprung up without cause. The seed was carefully saved and planted the next season. Many of the new plants developed double flowers, and the seed from these were saved and planted in turn, until he had acquired a sufficient stock of the true strain to place the new seed on the market. The double nasturtium is distinctly a new flower that has little resemblance to the single variety. The large blossom has more fragrance, grows on longer stems, and the plant develops a strong bush.

As a suggestion to amateur hybridizers, one plant grower advises that new shades of color in the perennial scabiosa or pin-cushion flower would unquestionably be very popular. Practically all colors are obtained in the annual variety of the scabiosa, but so far, only mauve, lavender and white have been obtained in the perennial variety.

VIBRATION SPREADS CAR LIGHT B. 856 OVER THE ROADS

Light from auto headlamps can be spread over the road by installation of a vibrating reflector that fits on the light



socket. The device consists of a coil with an arm extending forward and ending in a sensitive spring to which a small silvered reflector is attached. This reflector, which is in

front of the light bulb, vibrates at the slightest movement of the auto, causing a vibrating beam to be thrown back on the headlight reflector. This results in a broad beam that covers the road.

Vibra-Ray Corp.
583 The Arcade
Cleveland, Ohio

3962. *Ans Lee H. Eyeley, Salem, Ore.*
Representative in Angeles is William Johnson
 POPULAR MECHANICS 207

216 W. Washington or 1933 Lovelace Ave All Thrills of Stunt Flying in Captive Plane *Acroplane*

Outside loops, inside loops, barrel rolls, Immelmann turns, wing-overs, inverted flying and various other difficult aerial acrobatics of advanced flying may be imitated with convincing reality and complete safety in a "captive" airplane. Equipped with conventional propeller and powered by an electric motor,



*Eyeley Aircraft Corp
 216 W. Washington
 Salem, Ore.*



Doing Acrobatics in Training Plane; Electric-Motor-Driven Propeller Supplies Air Blast for Controls

the plane responds to its controls in a manner similar to a real airplane in flight. The strong air blast generated by the propeller, which acts as a fan, gives the effect of "flying speed." Universal-joint suspension gives it complete maneuverability. The plane is used for instructing stu-

dent pilots and supplying thrills for air-minded groundlings.

TINY WATER HAMMERS RUIN PROPELLERS *3947*

Constantly pounding at ships' propellers, thousands of tiny water hammers eat away bits of metal, causing erosion and, finally, bending and failure. This hammer action is caused by minute bubbles forming in the turbulent regions adjacent to swiftly turning propellers or turbine blades in water. These bubbles often contain gas compressed as high as 15,000 pounds to the square inch. Formed in areas of low pressure in the whirling currents of the propellers, they are moved to regions of much higher pressure and collapse. Immediately, the water that has been held back by gas pressure in the bubble rushes forward to restore equilibrium. This results in destructive hammerlike blows on the propeller, causing a strange "illness" in the metal. Even if the metal does not break, a serious loss in efficiency develops because the smooth surface takes on the structure of coarse sandpaper. A way to stop the water hammers or to repair the damage caused by their pounding is sought by hydraulic engineers.

Massachusetts Institute of Technology, Cambridge, Mass.

*Research under Prof W
 S. Paninhaber, Dept of
 Hydraulic Engineering*

B799. I. W. Thomas White,
505 Lehigh St
San Francisco, Calif

208

POPULAR MECHANICS



Baseball-Pitching Machine Which Delivers Balls for Batting Practice; the Robot Pitcher Can Be Used Indoors as Well as Outside

ROBOT PITCHER THROWS BALL FOR BATTING PRACTICE

Baseball is succumbing to the machine age and now a pitching machine has been built to deliver balls for batting practice. The ball is attached to a spring and whirls around an upright standard when struck. When the force of the blow is spent it is served again to the man with the bat. The robot pitcher can be used indoors too.

EARTHQUAKE TO BE PREDICTED BY USE OF "TILTMETER"

Earthquakes may be predicted, subterranean shifts of material before volcanic eruptions detected, and other small but important shifts in the earth's surface observed by means of delicate instruments known as "tiltmeters." These instruments depend on one of two general principles: Either they measure the tilting of the earth's surface by the change in position of a delicately balanced pendulum, or they make use of the interference of light reflected from two nearly parallel surfaces, one of which is a liquid naturally maintaining a horizontal position in response to the pull of gravity, while the other is secured to the rock whose movements

are to be measured. The latter method permits the construction of more rugged instruments and also their operation at the bottom of deep, narrow pits, and in other awkward places. Such instruments have had considerable commercial application in the measurement of movements in floors, pavements and piers, where only a small change can be tolerated.

ELECTRIC SCREEN FOR HOME ADDS TO COMFORT

Designed to prevent chilliness in the home or office, an electric screen that holds heat equal to that of the human body

has been constructed by the Westinghouse Electric and Manufacturing company. Technically, the sensation of cold is the result of excessive loss of body heat, and this screen is so wired that it is impossible for a person to lose any heat by radiation to the screen. This results in a feeling of warmth, even in chilling office or home air.



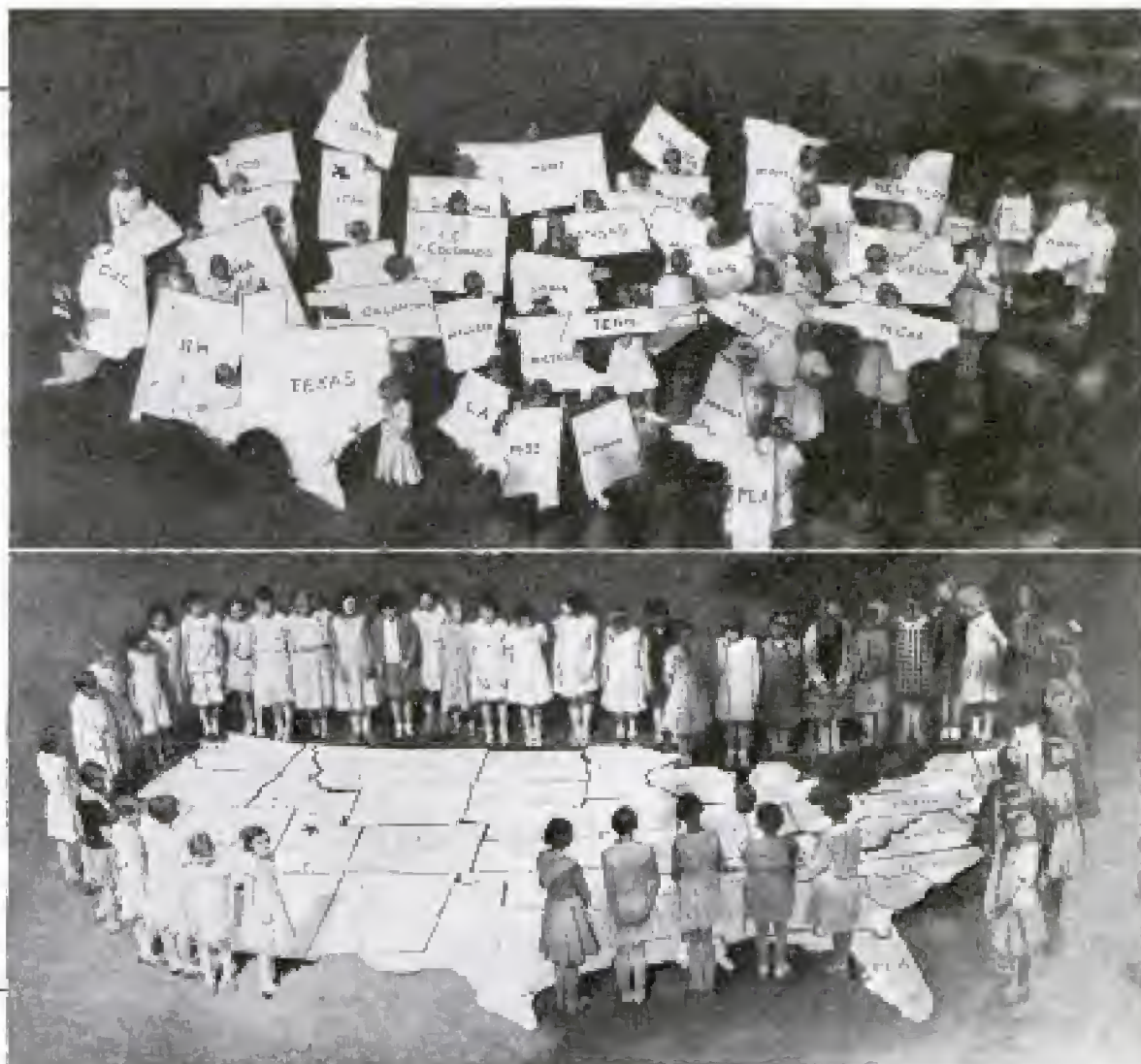
Heated to Body Temperature, Electric Screen Shields Two Persons from Office Chill

Continued by
George E. Merrill, Jr.
Bureau of Standard
Washington, D.C.

B1019

Cuth Davis Emery, 474 E 39th
Portland, Ore

Huge Puzzle Map Helps Teach Geography



Top, Each Member of Geography Class Is Holding a Piece of the Puzzle, Labeled with Name of State Whose Shape It Represents; Bottom, Puzzle Is Assembled into Map of U. S.

at Isrant Pass, Ore
Cut into pieces like a puzzle, a large map of the United States is helping teach geography in an Oregon school. Each piece of the map is a state, its size being in proportion to other states. When the pieces have been fitted together, the map is thirty-six feet by nineteen feet in size.

"RUBBER" MADE OF CHEMICALS UNAFFECTED BY SOLVENTS

Many commercial applications have been found for a rubber substitute made of chemicals which is unaffected by solvents and has several other advantages over the ordinary article. It has been widely used in the automotive field because of its resistance to the deteriorating action of most gases and liquids, includ-

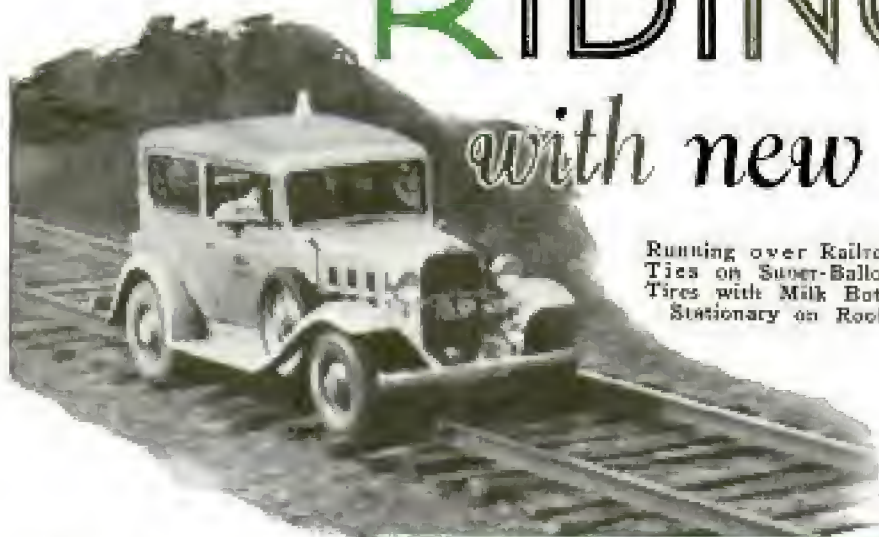
ing gasoline, for instance, as tubing to convey gas to the carburetor, and for covering ignition wires as a protection against oil. It also has proved satisfactory as a paint-spray hose, and as gaskets for electric refrigerators. The substance is known as "thiokol," and has the appearance and other characteristics of rubber, although none is used in its preparation. The raw product is similar to crude rubber and, like rubber, it is compounded and vulcanized in processing. When in contact with oils, its physical properties are superior to the best grades of rubber, tests have indicated, and, unlike rubber, it does not lose its tensile strength when immersed in gasoline, nor does it age or perish in storage, and oxygen does not appear to affect it.

The Thiokol Corp. Yardville, N.J.
Copyrighted material

B 10 27 Goodyear Tire Co. Akron, Ohio
 Essential Tire & Rubber Co.
 Akron, Ohio

RIDING ON

with new SUPER-



Running over Railroad
 Ties on Super-Balloon
 Tires with Milk Bottle
 Stationary on Roof

By MORGAN

BACK a few years ago, when a cartoonist sought to convey the impression of the ultimate in motor-ing opulence and luxury, he pictured a car mounted on big, fat tires—huge dough-nuts. Now, those "blimp tires" have be-come a reality. In Ak-ron, Ohio, tire capital of America, it is pre-dicted that, within the coming year, thou-sands of motorists will be riding on tires with about twice the air ca-pacity and about half the air pressure of the present balloons. And, within that same time, they say, practically all automobile manufactur-ers will offer these ele-phantine "shoes" either as standard or optional equipment on their cars.

This new tire develop-ment comes, literally, out of the air. For, it was in aviation that the need of a tire of large cross sec-tion and low pressure first developed. Planes equipped with conven-tional high-pressure tires

were seriously handi-capped by soggy land-ing fields. Both in tak-ing off and in landing, pilots were harassed by the fear of "nosing over" and cracking up. Emergency landings were just what the name implied, particu-larly in wet weather.

The tire manufac-turers came to their rescue. New tires were evolved with greatly increased air volume designed to operate at greatly reduced pres-sures. Wheel sizes were radically reduced—in some instances eliminated entirely. Airplane take-offs and landings became safer and surer in all kinds



Center, Airwheel on Plane Ab-sorbing Shock of One-Point Landing; Below, Plowing on Airwheels

LAZY AIR BALLOON TIRES

W. GIBNEY

of weather, and more comfortable for the passengers. Emergency landings lost most of their hazards, for the "air pillows" made possible safe landings even in cultivated farmland. In their application to motor cars, the blimp tires perhaps may be most easily described as an extension of the balloon-tire principle. In effect, they bear the same relation to balloons as balloons bore to the high-pressure tires of a dozen years ago. And, too, they offer the same type of problem both to tire manufacturers and to automobile designers. Considering the fact



Above, Preparing for Shotgun Test; Left, Blowing Out Tire with Gun at Sixty Miles per Hour



Left, Slowing Down after Blowout with Flat Tire, but Car under Control



that years were required to develop balloons to their present state of performance efficiency, it is scarcely to be expected that the first super-balloons "hot off the fire" would attain perfection.

Some of the early designs gave evidence of a hinge point at the shoulder. Others showed rapid tread wear. On a car not designed for these ultra-fat tires, there has been a rather pronounced

"float" at maximum speeds; steering effort has been increased particularly at very low speeds, turning radius has been increased somewhat, and the spring—shock-absorber—tire balance is somewhat upset by doughnuts. Intensive research seems to prove that pressures as low as ten to twelve pounds are impractical, and the recommended pressure has been revised to sixteen to twenty pounds.

Adapting future motor cars to the new tires, however, is a relatively simple engineering job. With their balloon-tire experience as a working basis, engineers have

Top, Riding the Sand on Super-Balloons; the Car at Right Is Equipped with Ordinary Tires; Bottom, Car with Super-Balloons Forced off Road on Soft Ground. Proceeds without Difficulty



but to develop and refine existing design to make today's motor cars fit tomorrow's tires.

Most conspicuous of the advantages of the new tire is improved riding comfort. Take a ride with one of the tire-test drivers whose job consists in giving these tires "the grief." He'll convince you in a hurry of their contribution to riding comfort—and other things.

Your ride starts over a rough brick pavement, the type that would keep your own car in a constant jiggle. Yet these air pillows absorb all trace of roughness. It's a revelation in riding ease and you say so, but the driver only nods and smiles: "You ain't seen nothing, yet."

Across a set of car tracks, but no jarring jolts; you hear the soft plunk of the tires striking the rails, but that's all.

The car turns off on a rutted country lane, the kind you'd usually travel miles out of the way to avoid. The driver tramps on the accelerator, the speedometer needle swings around. Your hair rises under your hat as the driver, with seemingly maniacal carelessness, weaves back and forth across the wheel tracks that you have learned to respect and fear. Here is a situation built-to-order for trouble, you think, yet nothing happens. Close your eyes, and the rough lane seems a well-maintained gravel road.

Off the byway onto an asphalt highway. Look and you see that it is suffering from that familiar malady known as "wash-boarditis." But you have to look to know it. You can't feel it. Whereas with thirty-five or forty pounds of air pressure, your wheels would be bouncing from bump to hump—and you'd be fighting the steering wheel for dear life—with only eighteen

pounds of air pressure, the tire literally swallows the irregularities without losing road contact.

"Notice that road shoulder," suggests the driver. You do, and you're mighty glad you're on the road. At the edge of the pavement, there is a drop of perhaps two inches and beyond is soft, loose gravel and sand—just the sort of spot that brings headlines: "Forced off Road, Car Turns Turtle." And, at that moment the fender at the wheel swings over into that deathtrap. Fortunately it's all over before you can think about it. Off the edge of the road, onto the treacherous shoulder, back up over the lip of the pavement and on.

"Nothing to it," admits the driver, "but it's a thrill the first time."

You look back. The big flabby tires have scarcely left a track in that "soft stuff." The route lies past the Akron airport. Suddenly the driver swings off the road and stops.

"Over there's a sample of what these tires have done for aviation," says he, pointing.

"Over there" is a mail plane stuck in soft ground. Airport attendants are tugging at the wings to release it. The pilot is "gunning 'er," propeller futilely clawing the air in the effort to pull out. As you watch, a giant tri-motor passenger plane ambles across that same soft spot, leisurely picks up speed and drifts off into the air.

(Continued to page 126A)



Slashing Hole in an Airwheel Tire to Test the Effects of a Blowout of Such a Tire



Slashed Tire as Plane Taxies along the Ground; Compare with View of Tire Below



Through Centrifugal Force, the Slashed Tire Fills Out; Left, Airwheel for Planes, the Basis of Super-Balloons for Autos



00/00 3 Cmt Clayton Cox
335 Marshall St

214

POPULAR MECHANICS

Earl Larsen, Mich



Lights Playing on Water Cascading down This Man-Made Waterfall Produce a Rainbow at Night; 1,200 Lamps Are Used

LIGHTS ON MAN-MADE CASCADE COLORED LIKE RAINBOW

Every color of the rainbow is painted at night on a man-made cataract in Michigan by automatically controlled lights. The eleven cascades are lighted by 1,200 lamps set under the crest of each fall. Enough water to supply a city of thirty thousand flows over the concrete falls each hour, 3,000 gallons being used in that period. The cataract is 500 feet long, sixty feet wide and has a fall of sixty-four feet. Water flows from the foot of the last cascade into a system of lagoons in the park surrounding the falls. The project is the second of its kind, the first having been built

for a world's fair at Barcelona, Spain.

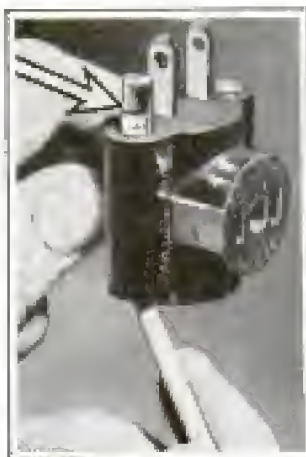
TALKING SCALES TO TELL YOU YOUR WEIGHT

Weighing machines that talk are telling what Europeans weigh, instead of pointing to a figure or releasing a printed card. Application of the "talkie" to this field has been accomplished recently. R. W. Smith, of the U. S. bureau of standards, in announcing the "talking" scales, predicted a possible extension of the idea to include the detection of slugs and counterfeit coins, after telling how various machines test every coin dropped into them.

PLUG WITH FUSES GUARDS HOUSE CIRCUIT

Preventing the blowing out of fuses in the house circuit, a three-way electric outlet plug with its own fuses has been produced. All trouble is localized. If faulty appliances blow out the fuses,

they can be pushed out of their socket with a match and replaced quickly, saving



a trip to the basement or wherever the house circuit fuses are located. In addition, only lamps plugged in at that particular outlet are darkened. There is nothing to take apart, and no live wiring to touch in replacing the blown fuses.

Electro Moline Engineering
Corp. 797 E. 140 St
New York

Science Service
6/2/32

B1012

COLDS LAST LESS THAN WEEK BUT GIVE LONG IMMUNITY

If you've just had a cold, you're immune for three months. And you cannot have another cold unless you contract it from some other person. These are some of the findings of Dr. Wilson G. Smillie, of Harvard University, who points out that the common cold lasts only three or four days. Experiments in isolated communities show that colds are not serious, but they seem to pave the way for secondary infections, such as bronchitis, sinus and ear troubles, and pneumonia.

ANY HOT-WATER TANK TURNED INTO AUTOMATIC SYSTEM

Any ordinary upright hot-water tank with a gas heater is easily converted into an automatic system with the aid of a kit now offered. This kit includes a thermostat, safety pilot, pilot tube and an insulating cover for the old tank. The installation is simple as all of the old equipment is saved, and hot water is provided as needed at only a fraction of the cost of a new storage system. Insulating jackets are provided for twenty, thirty and forty-gallon tanks.



Installing Insulating Jacket around Hot-Water Tank to Convert It to Automatic System

Spencer Thermostat Co.
34 Forest St. Allaboro
Mass



Vacuum Cups on His Shoes Hold This Man to a Glass Plate as He Is Pulled along a Cable

HUMAN FLY ON ROPE WALKS UPSIDE DOWN

Like a fly ambling across a ceiling, a stunt man in Los Angeles recently "walked" a cable upside down nearly 400 feet above the street. The secret of the feat lay in the shoes, which were fitted with rubber suction cups for soles. He planted his suction-shod shoes on the underside of a glass plate and was towed along a cable by a rope from a radio tower at the top of one lofty building to another tower atop a structure in the next block.

BIRD HOUSE LIKE A STREET CAR IS BUILT FROM SCRAPS

Resembling the Toonerville Trolley of Fontaine Fox's comic strip, a bird house has been built of scrap wood and metal. It has forty-five "apartments" for martins, three at the top, eight on each end and thirteen on each side. Weighing 125 pounds, the house is four feet long and three feet high and is made so that it can be taken apart for cleaning. It rests on a pole twenty-five feet high.

at home of
Fritz Meyer
Lawrence Kano

031014
216

Cont. Joseph Means
c/o The Star News
Pasadena, Calif.
POPULAR MECHANICS

This De-Luxe Highway Pullman Seats Eight



tion to the two in the driver's space. Two more seats may be added. The car is equipped with radio, electric fans, special lights, bookcase, wardrobe and dressing table. Sliding screens are provided for the windows, and two partitions are also fitted in to slide back when necessary. The



Two Views of the Highway Parlor Car Which Accommodates Eight Persons and Is Equipped with Radio, Electric Fans, Special Lights, Bookcase, Wardrobe and Dressing Table

Flivver tourists who rattle across the continent would think they were dreaming if they saw the de-luxe eight-passenger motor car the body of which was designed by a Grand Rapids manufacturer, John Thomas Batts. This car weighs 6,600 pounds. There are four cushioned seats in the passengers' compartment, in addi-

inventor decided against cooking in the car. He is particular about his menu and didn't want to carry a chef along, too. The body is completely insulated. Special stop and turning lights, front and rear, and nickelplated panels in front make the car easily visible at all times. Mr. Batts is a successful inventor.

COLDEST DAY FORMS LESS ICE BECAUSE OF FOG

Less ice forms in extreme cold weather than when the air temperature is twenty or thirty degrees higher. Fog, says Dr. W. J. Humphreys, of the U. S. weather bureau, is responsible for this nature puzzle. When the thermometer reads twenty or thirty degrees below zero, fog is most likely to form over water. Since it decreases the radiation of heat from the ice surface, fog keeps the ice warm, deposit-

ing over the ice an insulating sheet of fine snow that helps hold in the "warmth" of the frozen water. And during extremely cold weather, there is likely to be little wind to sweep the ice clean. In consequence, a relatively small amount of ice is formed. When the temperature rises to zero, however, the atmosphere is less foggy, and the ice, without any insulating cover, loses heat rapidly. This causes new ice to form at a faster rate, bearing out the fisherman's saying, "the colder the air the thinner the ice."

physicist Washington
22 C.

Chassis 1929 Packard 8, 140 in. wheelbase
Built in Los Angeles.
Savice Service 31042
6/29/32

Westinghouse
Electric & Mfg Co

B3650

POPULAR MECHANICS
HOME FUSES REPLACED
BY AUTOMATIC
SWITCH B31058

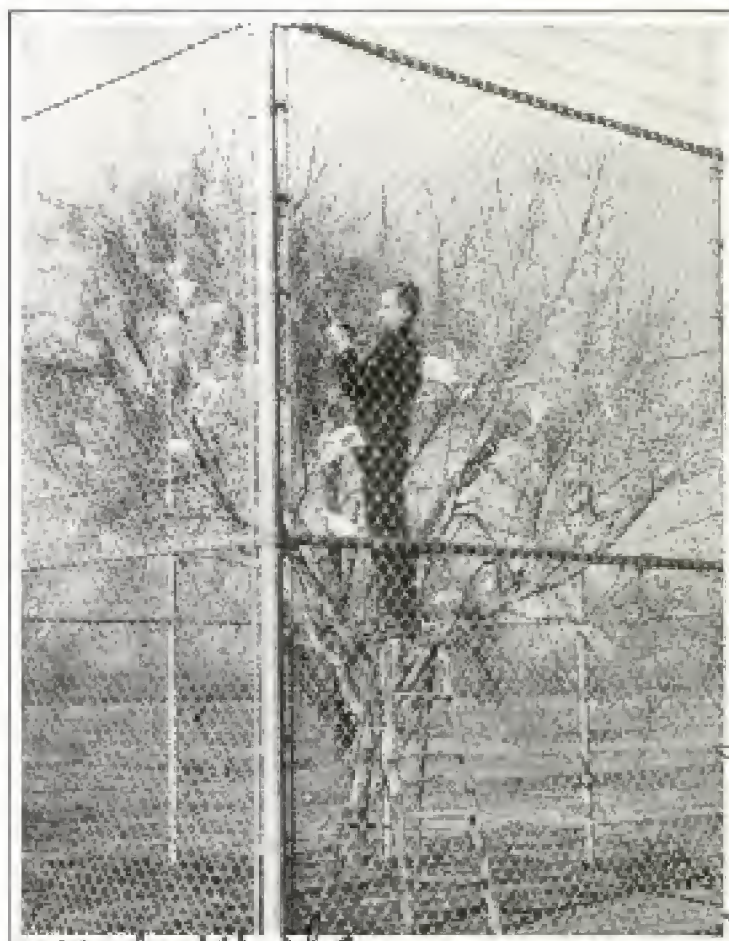
Replacing fuses and eliminating the dangers of overloaded electric circuits, an automatic switch has been devised by Westinghouse to guard against fire. All the householder needs to do is to relieve the load on the interrupted circuit, flip the switch back to the on-position and service is resumed. An electrician is not needed, because there is no danger of touching a live wire, no replaces are necessary and no pennies or hairpins can be used as substitutes for blown fuses to endanger the home. Added to the safety factor is the simplicity of restoring service and the elimination of fuse-replacement costs.

B-859
HAMMER FEED MILL IS
RUN BY FARM TRACTOR

Hay, fodder or grain can be ground into feed for cattle by a small mill that can be set up easily on the farm. Power may be supplied by the farm tractor or by motors of similar size. The mill prepares the feed for sacking and storage until needed.



This Mill for Grinding Feed Is Operated by Tractor or Farm Engine



Hybrid Peach Tree Recently Granted a Patent; It Is Inclosed in Cage to Prevent the Theft of Shoots

PATENT PROTECTS FRUIT TREE
BEARING GIANT PEACHES

Incased in a wire cage to prevent the theft of propagating shoots, the first fruit tree to be protected by patent is growing giant peaches on a farm near Louisiana, Mo. Under the plant and tree-patent law, protection has been given to the owners of this tree, a hybrid obtained by crossing two peach varieties. The peaches are free-stones, some of them four inches in diameter and weighing nearly a pound each.

TEN THOUSAND HOURS IN PLANE
RECORD OF FIVE PILOTS B3980

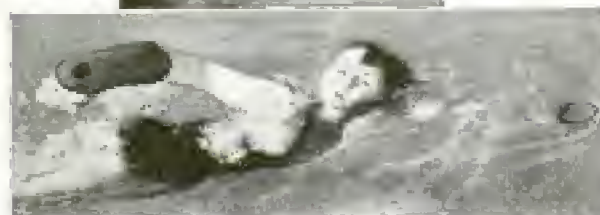
Five of the 6,929 transport pilots in the United States boast more than 10,000 hours in the air each, and 281 between 5,000 and 10,000 hours, department of commerce figures reveal. The five pilots are E. Hamilton Lee, of Omaha; James H. Knight, Chicago; Clyde Pangborn, Wenatchee, Wash; Ralph F. Thomas, Akron, and Edwin K. Jaquith, of New York.

J. I. Cape Co.
700 State St. Racine Wis.
Aeronautics Branch
U. S. Dept. of Commerce

Card Bros. Nursery
and Orchards Co.
Lawrence, Mo. (2)

Swim. Mitt Co.
 203 S. Dearborn
 218 Chicago. POPULAR MECHANICS
 12/10/18

**INFLATED MITTS FOR SWIMMER
 KEEP HEAD ABOVE WATER**



Inflated Mitt Is Strapped to the Arm; Bottom, Boy Learns to Swim with the Mitts

Offered as an aid to swimmers or those learning to swim, inflated mitts that are strapped to the back of the arm and hand will keep the entire body afloat. The outfit, made of rubber, is said to be more efficient than life belts, since it keeps the head above water even though the wearer is in an upright position. Arm movements are not impeded. It is possible to practice any stroke with freedom. Long-distance swimming is made safer, the mitts giving the wearer a chance to rest and keeping him from sinking if seized with cramps.

**CHEAP WAY TO TEST ACID SOIL
 HELPS GARDEN MAKER**

Many a garden maker is puzzled over the expert's advice on what to plant if soil is acid, because there has been no cheap

Wild Flower Preservatory Society, Washington, D.C.

La Motte Chemical Products Co.
McCormick Bldg.
Baltimore Md

and easy method of testing the soil. Here is a simple test: Mix a small quantity of soil with four times its volume of pure water, in a bottle, and allow it to settle for two or three hours. On a porcelain or enamel slab place a drop of a dilute solution of bromocresol purple indicator. Add to this five to ten drops of the clearest water from the soil bottle with a medicine dropper. If the mixture on the slab turns a distinct purple, the soil is neutral. If the color is brownish, the soil is slightly acid, and if yellow, the soil is highly acid. The indicator solution is easily obtained, from drugstores or chemical houses. Plants that require a neutral soil will fail in a soil showing a yellow test. Lists have been prepared by agricultural authorities to show what kind of soil is best for a particular plant.

authenticity of chemical tests Prof. J. H. Gregory

**PASTE FOR ENAMEL FIXTURES
 PROTECTS THE BATHROOM**

Enamel surfaces of bathroom fixtures can be protected from scratches and other damage during building and repairing work by covering them with newspapers and a new paste. This paste, which comes in powder form, is removed easily with water after the workmen have finished. The protective coating of newspapers withstands all common abuses, and the paste is applied with a brush.



Newspapers to Protect Enamel Fixtures from Damage Are Held in Place by Paste

Kohler Co., Kohler

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~~1397~~ Cont. Esq. Noonan, % Mr. Ward
697 MacNeal, 82 Rochrose Place,
Forest Hills Gardens, L. I.

On the Bridge in a Storm

By JOHN MACNEAL

OUR great liner feels her way down the channel and points her nose to the sea. Three thousand miles of watery track lie between her and New York, whither she is bound by way of Halifax, N. S., and where most of our several hundred passengers will disembark.

Unconcernedly they have booked rooms in this super-hotel which combines magnificence of accommodation with transportation. Dancing, dining, hiking, tennis, swimming, cards, smoking, drinking—as varied and scintillating as life ashore—proceed on board.

Up on the bridge, the officers pursue the monotony of guiding



Top, Lookouts Peering into the Gray Gloom Ahead during a Gale; Below, Heavy Seas Viewed from the Deck of an Ocean Liner Which Is Plowing through the Mountains of Water



Members of Crew at Their Posts in Control Room during a Storm: Note the Many Mechanical Aids and Instruments Which Add Greatly to the Safety of the Modern Ocean Liner

the ship across the miles of open sea. Five days out, all this changes. The sky grows overcast, the wind freshens from the southwest. The sea turns back a snarling white lip here and there. It is colder and cheerless, and the liner goes slowly and in difficulty.

Life seems drained away from the body of the ship. The public rooms are empty; there seem too many waiters in the great salon where the strains from the orchestra clash feebly against the straining groans of the liner's fabric. But up above, the brain of the ship has become alert. Two officers of the watch, both qualified master mariners, are on the bridge. Following a consultation when the weather changes, the junior officer telephones the captain, suggesting the advisability of slowing down to avoid damage to the ship from pitching and pounding and the breaking of heavy seas over the foredeck.

In a moment the captain appears on the bridge, thrusting his arms into his oilskins. For a moment he pauses in the chart room, glancing at the barograph, where

the steep drop in the thin red line tells him how rapidly the glass has fallen. Coming into the pilothouse, he orders half speed, and the telegraph clangs as the quartermaster rings the order down to the engine room and, when it is repeated back to him, reports, "Half speed it is, sir."

By now the great gray seas are rising in towering mountains over the ship, threatening to break inboard and engulf her. But as she gradually slows up, the riding becomes easier, she ceases to lump heavily into each oncoming monster and rises and falls more gently as the seas pass under her.

The captain goes out to the weather corner of the bridge where the senior officer, with rain and spray dripping from his oilskins, peers into the gray gloom ahead. He has to shout to make his voice heard above the roaring of the wind, "Glass still falling, it's going to blow harder yet."

The junior officer in the pilothouse superintends the work of the quartermasters at the wheel and telegraph.

Suddenly from out of the grayness rises the towering white-topped crest of a giant sea. For a moment it hangs over the ship, then, with the rending crash of hundreds of tons of falling water, it breaks inboard over the foredeck. A seething mass of water rushes aft along the deck, burying winches, ladders and hatches from sight while the whole ship trembles under the impact.

"Stop her," calls the captain.

Again the telegraph clangs, the order is passed to the engine room and repeated back to the bridge, "All stopped, sir."

With her engines silent, the ship lies rolling to the mighty swell that comes up under her port bow, but shipping no more water. At last the tarpaulins emerge from the turmoil and the captain breathes a sigh of relief as he sees that no hatches are stove in.

"Slow ahead, forty revolutions." The telegraph is moved to slow and the order for forty revolutions passed down the telephone. Watching the indicators which tell of the first movement of the propellers the junior officer reports, "Engines going ahead, sir."

Then, over the sea to the sou'west, can be seen steadily advancing toward the ship the clear outline of a fierce squall.

"Shift of wind coming," shouts the captain, but hardly has he spoken when the squall strikes the ship and the men on the bridge are blinded by hail and spray.

"She's not steering, sir," shouts the junior officer from the pilothouse.

"Full ahead starboard, stop port." To the quartermaster at the wheel, "Hard astarboard."



Junior Officer Turning the Small Brass Handle That Closes the Hydraulically Operated Watertight Doors during a Storm

Watching the gyro repeater, the junior officer reports that she is coming back to her course.

"Half ahead starboard, slow port."

The squall passes as quickly as it came, leaving the wind blowing hard from the nor'west with the sea confused and dangerous. When the ship is again steadied on her course, half speed is ordered.

"The glass has started to rise, sir."

"First rise after low indicates a stronger blow," mutters the captain, quoting an old seaman's adage. "We'll probably get some snow with it, too."

True to his prediction the snow comes



Top, Heavy Seas Breaking over the Foredeck; Below, an Officer Listening on the Submarine Telephone

in blinding flurries, and it is worse than fog, for it not only robs the navigator of his sight but deadens the sound of fog-horns and sirens as well.

"Close the watertight doors, start the whistle, double the lookouts," orders the captain.

With eyes strained and ears keyed to catch the sound of any fog signal, the captain and officers gaze ahead into the white blanket of falling snow. Soon they themselves look like white-shrouded figures.

For weary hours, as the ship rises and falls to the great surge of the seas, this ceaseless vigilance is maintained. At the end of each four hours' watch, the officers and quartermasters are relieved; but not so the captain. The day passes and darkness falls, yet for him there is no rest; upon him devolves the ultimate responsibility. Another day breaks to show a sea gray and cold and cruel with the driving snow sweeping across the swells.

"Get the average revolutions, and I'll work up a position," says the captain.

The information is telephoned up from the engine room. "Sixty revolutions, there'll be fully twenty-percent slip with this heavy pitching. What speed is that?"

"Nine knots, sir."

"Right. Keep an eye on her," to the senior officer. "I'm going into the chart room. Stop her at once if you hear anything blowing."

"Aye, aye, sir."

Together the captain and the junior officer go into the chart room and work up a dead-reckoning position which the cap-

tain plots on the chart. "Hm, should be near the edge of that fifteen-fathom patch. See what water you've got."

The junior officer reaches up and takes the control switch of the submarine signal fathometer. Almost immediately a finger of light points to the figure twenty-five on the indicator.

"Let me know when you get fifteen fathoms, then we can steer straight for Chebucto Head," orders the captain.

Flashes of light continue to appear on the face of the indicator pointing to varying figures, suddenly one points to the fifteen-fathom mark. When this is reported, the captain alters course for Chebucto, the headland which guards the entrance to Halifax harbor. And after running for some hours on this course, still in blinding snow through which they cannot see half a ship's length beyond their own stem, the junior officer, listening on the submarine telephone, reports that he can hear Sambro light vessel's oscillator.

A radio bearing is taken of the lightship and the distance from it is obtained. The resulting position proves the ship to have been set down to leeward of her course so she is hauled up and again headed for Chebucto. The fathometer is kept operating and the depth of water under the ship's keel reported every few minutes.

At last, getting close up under the lee of the land, the sea gradually moderates, though the gale continues to blow and snow to fall. Then, fine on the port bow, is heard a familiar foghorn, giving four long blasts.

"That's the pilot cutter. Stop her. Steady as she goes."

Suddenly the white shroud is cut by the thin line of masts, a slim dark hull appears. It is the little auxiliary schooner in which, through the worst of Nova Scotia's bitter weather, those hardy Blue-nose pilots meet the incoming ships.

B. 713

CLOCK WITH SINGLE HAND SHOWS CORRECT TIME

Containing an oblong face and only one hand, a clock invented by an Ohioan nevertheless gives the time as accurately as a two-hand timepiece. The single hand does not rotate but moves around

*Dr. A. D. Snively
Norwalk, Ohio*



Wide World
This Clock Has Only One Hand Running around a Little Track, but It's Accurate

an oval track, making one complete revolution every twelve hours. Minutes are marked between the hours, so that the one hand also shows the minutes after each.

FIRE ENGINE OF BABY-CAR SIZE FIGHTS FLAMES EFFICIENTLY

B. 1013

Mounted on a "baby auto" chassis, an efficient fire-fighting truck has been developed in England. A nine-horsepower motor drives the engine at fifty miles.



photo
This Fire Engine Is Small but Efficient

Dr. Richard Sansome
Copyrighted material

03/19

at meeting of
American Forestry
Association
May 26.
03/04/

Gun in Foreground Shoots Cable across Canyon to Tower on Hill at Right



FORTY YEARS' SOIL WASTED IN ONE BY MAN

Rich topsoil that nature needs forty years to build up is wasted in a single year by man's failure to guard against erosion. Arthur M. Hyde, secretary of agriculture says that, according to experts, it takes nature not less than 400 years to build one inch of topsoil characteristic of the rolling parts of the corn belt. By planting corn continuously in that area, man has permitted erosion to remove that inch of soil in from ten to fifty years, depending on the steepness of the slope. Man has caused this, says Secretary Hyde, by cutting forests from large areas, burning the ground cover and exposing the land to the washing of surface water. In addition, he overgrazes the original prairies and, by destroying much of the vegetation,

COASTGUARD GUN AIDS LINEMEN IN CANYON COUNTRY

Shooting a line from one tower to another across deep canyons, a coast-guard line gun was used in stringing power cables in California. Since the rough country was in a national park, the trees could not be removed from the path of the line. A projectile made of old shaiting with an eyeholt was attached to a manila rope. When the projectile was fired, it pulled the rope to a distant tower. Then the cable was attached to the end of the rope, hauled in by linemen at the tower and made fast. The longest span was 1,200 feet. The gunner became so expert that he frequently succeeded in landing the projectile and rope across the arms of the tower that was his target. Besides saving the landscape from being disfigured, the expense of clearing a path through the trees was eliminated.

tion, leaves the soil to the mercy of running water. Slopes are plowed against, rather than with, the contour of the land. Two sets of consequences ensue, Secretary Hyde points out, one affecting soil fertility and the other the water supply. Erosion removes not only the fertility of the soil but removes the soil itself. As the humus covering and the moisture reserves of the soil are lost, fertility on the farm and carrying capacity on the range disappear. The tillable areas decrease because of gullying, and the expense of cultivation increases where erosion has begun to divide fields into plains and valleys. In many parts of the United States, from two to ten feet of topsoil have been removed in less than thirty years. All crops in this country annually remove about six billion pounds of plant food from the soil. Erosion annually removes about twenty-one times as much. In some parts of the country, the situation is crit-

Southern Electric Power Co., Riverside Calif.
E. J. Porter, Distribution Engineer

Ricker Mfg Co
239 N. Water St

Leary Mfg Co

Rochester, N.Y.

POPULAR MECHANICS

Plymouth, Mich 225

ical, Secretary Hyde says in warning that, unless immediate steps are taken to retard erosion, the United States will have great barren regions similar to those in famine-stricken China.

BABY CRANE FOR BOAT MOTORS LIFTS BIGGEST OUTBOARD

Weights up to 300 pounds can be handled easily by a miniature crane designed especially for transferring the largest outboard motors to and from boats. Few outboards weigh more than 200 pounds. The crane, which is fastened to the dock, is worm-gearred at twenty-to-one and has a boom that swings in a seven-foot circle. The highest point of the boom is five feet, three inches above the dock and it can be lifted from the mast for winter storage. Two of the "baby" cranes mounted on the edge of the dock can be used as davits to haul up boats weighing 600 pounds.

UNUSUAL USE OF FENCING PROTECTS AIRPORT

When a new dumping location was opened near the Newark, N. J., airport, it was found that the prevailing westerly winds caused quantities of paper and other refuse to be scattered over the landing field and runways. To prevent this, a high fence of fine-mesh wire was erected between the airport and trash heap. The fence serves as a barrier for the debris.

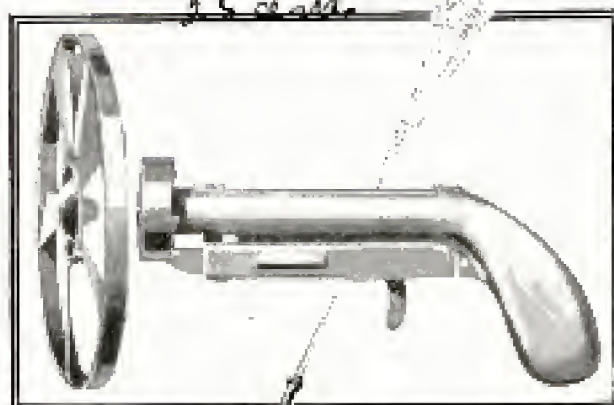


Wire Fence Erected between an Airport and a Dumping Location to Keep Refuse Off Landing Field

Cml. W. E. Stewart
Box 630, Severn, N.J.

"FLYING TOP" SHOT INTO AIR BY TOY GUN

Shot into the air by a toy pistol, a top that flies and then spins on the floor or ceiling has been introduced. The pistol sends the top seventy feet into the air. Revolving at high speed, the



Discharged by the Spring Pistol, This Top Is Lifted High into the Air by Giroulike Blades

toy bounces lightly away from any object it touches, preventing damage when flown indoors. It is round, with lifting blades like an autogiro plane.

COLD IS TREATED AS SYMPTOM INSTEAD OF DISEASE

Common colds are now being considered as a symptom rather than as a disease. The journal of the American Chemical society says that experiment indicates that when vitamin deficiency is overcome, the cold disappears. Just as a headache is a symptom, it is suggested that a cold likewise may be a sign indicating infection of tonsils or sinus, an acid condition of the system, or a decrease in the defenses of the body due to insufficient vitamins. While vitamins may not be anti-infective agents, it has been suggested that infection may follow the weakening of the tissues due to a vitamin deficiency.

Among people over ninety-nine years old, there are nearly three women for every man.

Industrial and
Engineering Chemistry

03527

Machines – Masters

By GEORGE W. GRAY *Sparkill ny*



Dr. Karl T. Compton

MACHINES, which owe existence to their power to serve human wants, are now accused of turning the tables on man. They are held responsible for unemployment and all the ills which today afflict the world.

A recent suggestion of this point of view comes from Dr. Raymond B. Fosdick, of the Rockefeller Foundation. "Our machines," he says, "have fastened themselves on every detail of our lives. They have called into being millions of people who otherwise would not have been born. For these hundreds of millions they are the sole means of support. Stop the machines, and half the people in the world would perish in a month."

But what do the scientists and engineers, the creators and builders of the machines, say? Recently a leader in the physical sciences, Dr. C. E. K. Mees, expressed doubt as to the human value of mechanical improvements. Doctor Mees is an eminent chemist, director of research for the Eastman Kodak company, and his laboratory has been a prolific incubator of contributions to the machine age. Yet,

save in checking disease, he does not think that science and engineering have benefited man.

"Will any student of history agree that the inhabitants of an American city are on the whole happier than those of a Greek or a Babylonian city of the past?" asks Doctor Mees. In those days there was more



William Green

leisure, less pressure, more opportunity for the exchange of ideas, less emphasis on material things. There is little that a man can get today which he could not have had in Athens."

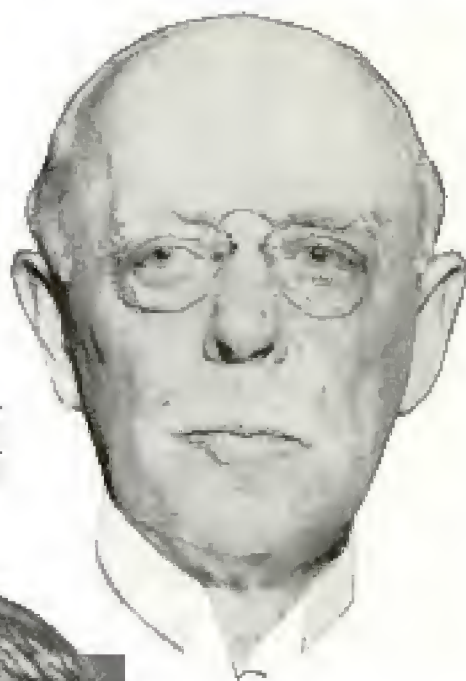
But the taint of slavery is smudged over the Athenian glory. The only people who could get "things" and enjoy them in ancient Athens were the aristocrats.



or Slaves?



Left, Dr. James Henry Breasted; Right, Dr. Arthur D. Little; Below, Dr. Willis R. Whitney



muscles of men and women innumerable burdens and labors, and transferred them to the steel muscles and electric nerves of machinery. It is only when the machine is exploited without thought to its human consequences, that it becomes a danger and a detriment."

During its greatest period, Greece had 12,000,000 slaves and only 5,000,000 freemen. For every hour that the small patrician class spent in comfort and leisure and enjoyment, many hours of brutish labor had to be performed by human slaves.

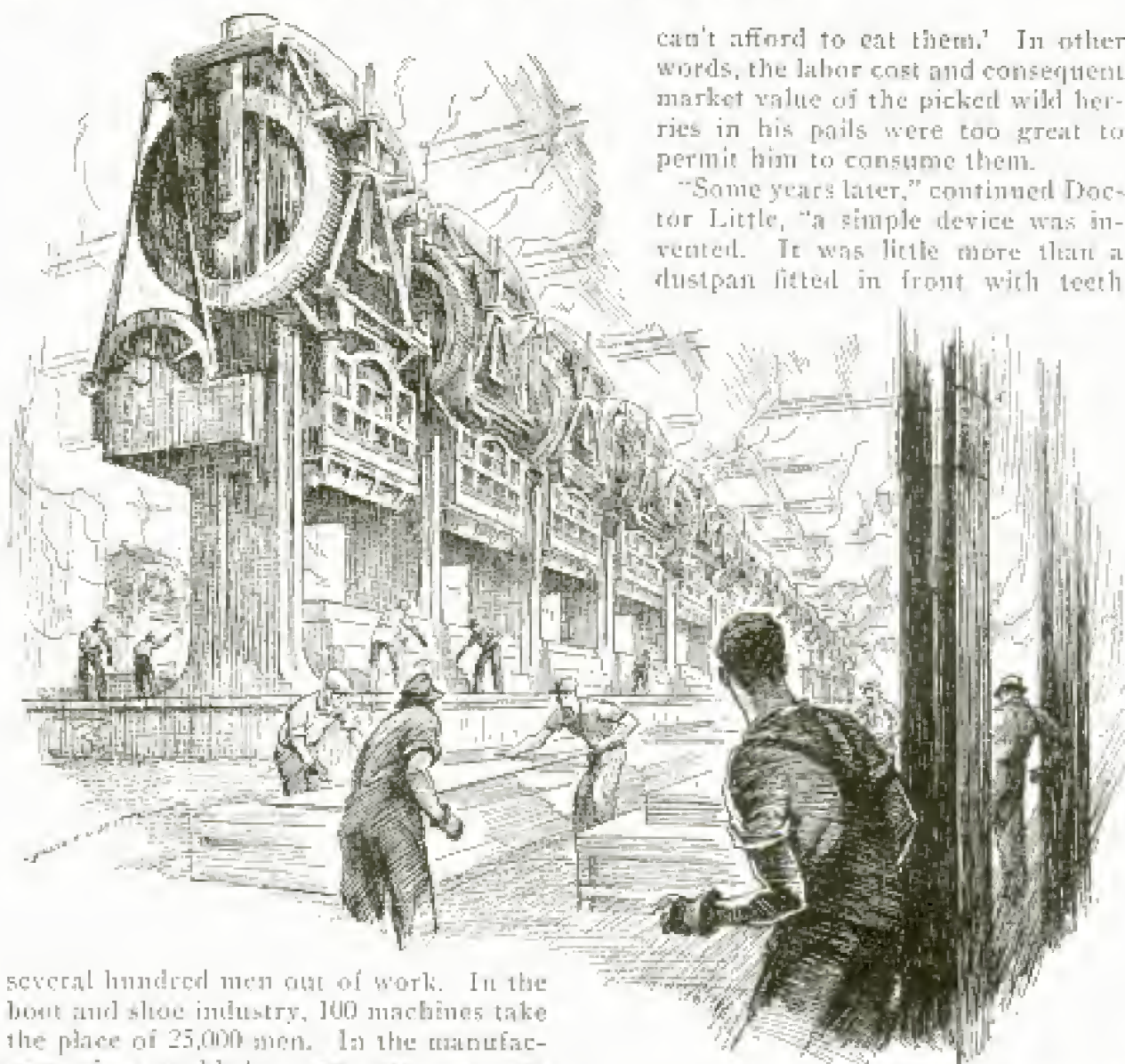
"The machine in itself is not an evil, but a good," said Dr. Karl T. Compton, president of the Massachusetts Institute of Technology. "Its good lies in this—that it has taken from the overloaded

ish all machinery, and put back into the muscles of men all the labor now performed by steam, electric, gasoline, and water power, we should need at least five billion human slaves, says Dr. W. E. Wickenden, of the Case School of Applied Science. Of course such a transfer is impossible. That's more people than the total population of the earth!

William Green, president of the American Federation of Labor, recently pointed out that within the last ten or twenty years mechanical improvements in some industries are comparable with a century of earlier progress.

"Take, for instance, the manufacture of electric-light bulbs," said Mr. Green. "In 1918, it took one man a whole day to make forty bulbs. The next year came a machine that made 73,000 bulbs in twenty-four hours. Each of these machines threw





can't afford to eat them.' In other words, the labor cost and consequent market value of the picked wild berries in his pails were too great to permit him to consume them.

"Some years later," continued Doctor Little, "a simple device was invented. It was little more than a dustpan fitted in front with teeth

several hundred men out of work. In the boot and shoe industry, 100 machines take the place of 25,000 men. In the manufacture of razor blades, one man can now turn out 32,000 blades in the same time needed for 500 in 1913. In steel blast furnaces, seven men now do the work of sixty in casting pig iron. In machine shops, one man with a gang of semi-automatic machines replaces twenty-five skilled mechanics."

No one can deny that the machine displaces labor. Indeed is not that its chief reason for existence: to save labor and increase production per man? But there is another side to the picture. Recently I was talking with Dr. Arthur D. Little, the well-known industrial chemist, and he related this experience from his boyhood:

"I was climbing Mount Chocorua, in New Hampshire, and came upon a man who was eating a luncheon of dry bread, while beside him were several large pails heaped with blueberries. I asked him why he didn't eat the berries. He answered, 'I

like a rake, but it enabled a man to pick a bushel of blueberries in the time formerly required to pick a quart. At once the labor cost of blueberries went down. Canneries were established, many more pickers found employment, and though they received far less per quart than the hand pickers had, their daily earnings were so increased that they could have lunched on caviare sandwiches had they cared for such food."

This same process has gone on in industry. With the growth of the automobile factories, the carriage workers and harness makers lost their jobs, but a hundred times more jobs were created for automobile makers. Think of the enormous electrical industries that grew out of Faraday's discovery of the principle of the dynamo. Perhaps some hundreds of pony-express riders and postboys were jobless as a re-

sult of Morse's invention of the telegraph; but an army of new workers—linemen, construction men, operators, messengers—were given employment by the telegraph service. The telephone industry alone employs some 500,000 workers in the United States—half a million jobs for which science is directly responsible. The inven-

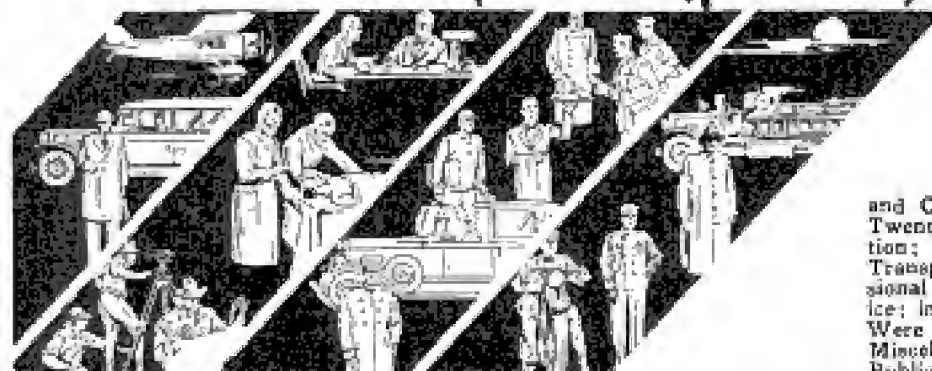
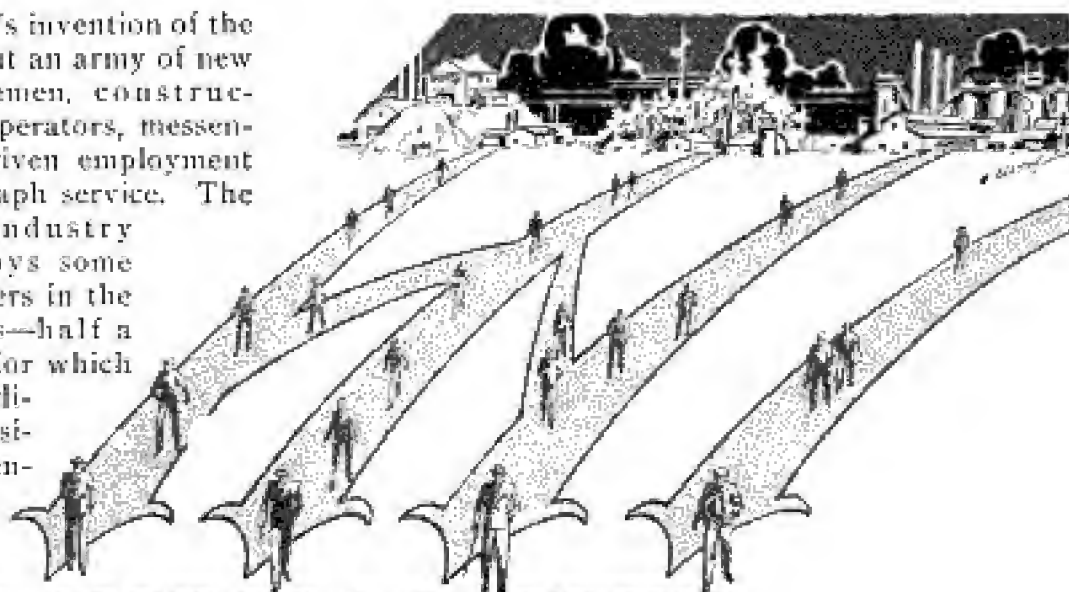


Diagram Showing Displacement and Replacement of Workers during Last Ten Years; Sixteen Left Farm, Field and Forest, One the Mines, Four Manufacturing and Construction, a Shrinkage of Twenty-One for Each 1,000 Population; Seven of These Went into Transportation, Seven into Professional and Seven into Domestic Service; in Addition Three New Workers Were Needed for Trade, Clerical and Miscellaneous Work, and One for Public Service, a Net Gain of Four

tion of the linotype machine and the rotary printing press did not make jobs scarcer or less remunerative for printers and newspaper workers; quite the contrary.

But the printers who were accustomed to setting type by hand had to learn a new technique when the linotype machine was installed; and so with all the others. "Our present accessories in electricity, mechanics, and electronics lead to new kinds of people with new kinds of minds," as Dr. W. R. Whitney has said.

The contrast between the old and the new was dramatically put by Doctor Little: "The jinricksha man is still slave to his machine; the locomotive engineer is master of his. What driver of a motor truck would change places with a transport coolie? What operator of a bandsaw would take his place in the pit to work one end of a two-man saw while blinded by the shower of sawdust? Who would prefer handling pig iron by the strain of his own muscles, to moving tons at a time while comfortably seated in the control house of a majestic crane? Brawn, with-

out intelligence, can make slow progress with a spade. It takes a man to operate a steam shovel or pick up a car of coal and dump it with a turn. Who would rather swing a sledge than feel that he controlled the mighty power of a steam hammer?"

No man who ever used the telephone to summon a doctor in a dangerous emergency, or who has been on a sinking ship when the radio SOS brought rescuers to save him from what in a machineless age would be certain death, will call the machine a devil or a Frankenstein monster.

But there are those who claim that the slavery is of another sort. The machine has cluttered up our lives with "things," it has standardized us into monotonous patterns of working and thinking, it has made man materialistic. Stuart Chase recently declared that men in a machineless country are happier, more content, than the fully machined men of the United States.

When I mentioned this to J. F. Coleman, past president of the American Society of Civil Engineers, he laughed. "The oyster, in his ignorance and lack of expe-

03 527



Above, Dr. C. E. K. Mers of the Kodak Research Laboratories; Right, Doctor Whitney Studying Problems in Radio



rience, may be more contented than the human being," answered Mr. Coleman, "but who wants to be an oyster?"

"The machine has its disadvantages along with its gains," he continued. "For example, by making vehicles easy to own and operate, the automobile industry has made them numerous. In consequence, city streets and country highways are congested with traffic. But an equal number of horses and buggies and ox teams would create even worse congestion."

Dr. Whitney, director of research for the General Electric company, has had as much to do with the mechanization of modern life as any man now living. I asked what he thought of the suggestion that the machine is enslaving man.

"Do you suppose I would keep on in industrial research if I thought the machine a detriment to character," answered this man who has been exploring electricity for thirty years. "No, sir," he added, with characteristic gusto. "I feel that these mechanical improvements are not only material gains, but spiritual goods. Man is essentially spiritual, but his tokens of value call for material, even mechanical, devices.

"Science is at our service—it can enslave us, or it can free us—but we ourselves

must make the choice. We use radio for mere amusement and noisy advertising. We use our wealth for armies and schemes for destroying our neighbors. We cannot change at once, but there is a gradual tendency to get together and live at peace.

"Look at the Nile laborer pumping water by his own muscle power. It takes all his time to earn the food he eats; we can't expect much from his brain. An electric pump will free that man."

But free him for what?—he can't even read.

"Nobody could read until someone experimented," shot back Doctor Whitney. "Where did our finest minds come from if it was not through trying new things, winning leisure, and then using that leisure for growth and mastery. The Greek slave, the Egyptian fellah, the man-with-the-hoe developed into the modern philosopher who sees that man is essentially spiritual.

"Idleness is not the goal of our mechanical improvements, but leisure for new experimenting, for new experiencing, may well be.

"If there is one thing that modern civilization can do," concluded Doctor Whit-

ney, "it is to free people from slavery and strew spiritual opportunity along their path. I have an idea that man is only halfway from nowhere to somewhere worth while."

A picture of the progress of man from "nowhere halfway to somewhere worth while" was recently given by Dr. James Breasted, founder and director of the Oriental Institute at the University of Chicago, in dedicating the new building of the institute, which he called "a laboratory of man."

"In the Nile valley," said Doctor Breasted, "we watch the triumphant conquest of material forces, at first slow and then moving with astounding rapidity, as these ancient Nile dwellers came completely under the spell of their material triumphs."

"When five or six hundred years of desert storms had buffeted the Great Pyramid, a thoughtful Egyptian looked up and sang of the colossal futility of 'things' and the importance of character."

As an instrument of exploitation or profiteering the machine is doomed by common sense, but as an instrument of service to mankind, as a lightener of the load on labor, as a cheapener of the necessities of life, as a more equitable distributor of wealth, as a liberator of humankind from drudgery into a greater leisure for the exercise of the free spirit—as this kind of servant of "the veiled splendor of the moral vision," the future of the machine may well be unending.

ROBOT CLOCK WORKS FOR YOU IN YOUR ABSENCE

Electrical devices in the home can be started and stopped at the right time by a robot clock just produced. The clock is



plugged in, levers set at the starting and stopping hours, and the rest is done by electricity. Thirty-six levers around the dial provide a wide range for setting the clock.

Tests have proved a new French anti-aircraft gun is effective at a height of over seven miles.

*Clock. Trola Mfg. Co.
5430 S. Broadway
Los Angeles, Calif.*

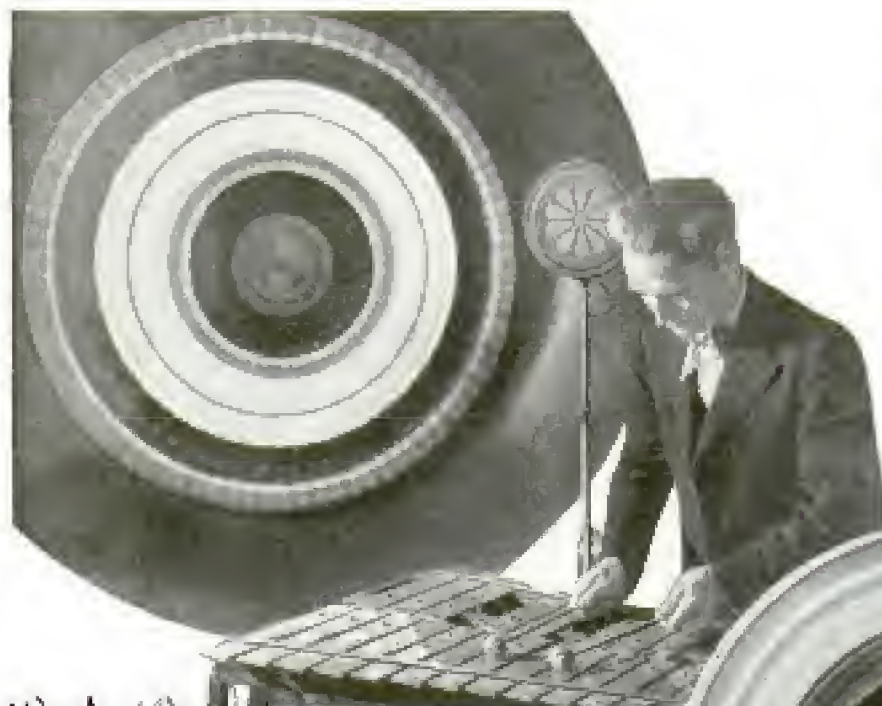


The Owners Spanning the Front of Their House, One of the Narrowest on Record

HOUSE WITH TEN-FOOT FRONT IS THREE STORIES HIGH

Only ten feet wide, a three-story house with six rooms has been built in California. The lot on which it was erected is ten feet wide by fifty feet long. A living room, nine by nineteen feet, and a kitchen, nine by eleven, occupy the first floor. A stairway leads to the second floor, where there is a bedroom, nine by thirteen, a full-size bathroom and a nursery. Another stairway leads to the third story, containing a laundry and a sunroom. The occupants also have a roof garden and space for clotheslines.

B3 1000
see Feb 1931-187



Wide World

Above, Two Notes Appear as Colors on Disk; Right, Inventor Looking through Aperture in Disk

MUSIC IS TURNED INTO COLORS ON SPINNING DISK

By registering each of the eighty-eight notes in color, a fast-spinning disk presents musical numbers as ever-changing rainbows. The slightest variation in tone will cause an immediate change in the myriad colors on the disk. Radio waves and the Baird scanning-disk system of television are combined in the instrument to reveal the colors of music. Although the most spectacular point is the vari-colored display of hues on the disk, the device has a practical application in testing the voices of singers or the tone of any musical instrument. The inventor, Arthur L. Smith, believes his device represents the application of a theory that has interested science for 300 years, and that the common practice of music critics in employing words referring to color and sight expresses the universal desire that music should not only be heard but seen as well.

CENT A MILE COST OF FLIGHT WITH DIESEL MOTOR

Operating at slightly less than one cent a mile, a plane equipped with a new-type Diesel motor recently made a test flight of 2,400 miles. The engine has the cylinders arranged in radial design, with a va-

riable control of the timing of fuel injection. This makes possible automatic control of the amount of fuel injected into the motor by a single operation of the throttle. The engine can be idled at low speed. Feel and handling of the throttle at taking off and landing are the same as for a gasoline-motored craft. The cylinders fire smoothly at all



speeds. The fuel system combines the functions of correct injection and metering of the fuel and forcing it through the injector under adequate pressure. Crankcase and crankshaft, connecting rods and pistons are conventional in every respect, but are ten per cent heavier than in the gasoline engine. Larger engines of the same type are being developed for use in transport planes. Because of its economical fuel consumption, the weight of fuel to be carried is reduced to a minimum. The fire hazard also is lessened because the fuel oil is non-inflammable.



B3 913

The Esniberson Corp.
Dallas, Texas

Carl. Watson Davis Managing Editor. Science Service 5/27/32

IMPROVED PLANE WINGS PERMIT SLOWER LANDING

B1044

Wings that enable airplanes to land more slowly without sacrificing top speed are being tested in wind tunnels and in flight. Two new designs have been offered to aeronautical engineers. One is the Fowler variable-area wing, which consists of a normal wing with a smaller one set in the trailing edge. The small wing moves down and to the rear of the main wing, increasing the area of the latter and besides acting as a slotted flap. Tests on a model show that it has two and one-half times the lift of the conventional wing. With this wing, when the pilot is about to land, he swings the auxiliary airfoil or flap downward and to the rear of the trailing edge, in which position it gives the highest lift and permits a much slower landing speed. When the flap is in its high-lift position, a slot is left between the main wing and the flap, resulting in the acceleration of the smooth flow of air over the top of the flap. A similar type of wing, the second under consideration by engineers, is one having a small auxiliary airfoil placed above and to the front of the main wing. The combination of a small auxiliary wing with the conventional wing increases the lift about fifty-three per cent, tests reveal. A small auxiliary wing has been added to a commercial-type plane, and on this ship, it decreased the landing speed from forty-nine to thirty-nine miles per hour at a sacrifice of only two and one-half miles per hour top speed. This wing enables the airplane to glide at a much steeper angle without loss of control, which means that it can land over an obstruction in a much smaller space. The present tendency in the design of planes is in answer to the demand for increasing maximum speed without increasing the landing speed. This involves finding of an airfoil that will produce the greatest lift with the least drag.



Sphere Gap for Measuring High Voltages; the Flash of Artificial Lightning Jumps between the Metal Balls

Wide World

MILLIONS OF VOLTS MEASURED BY HUGE SPHERES

To measure the tremendous voltages built up in producing artificial lightning, a special apparatus was evolved in the laboratory of the General Electric company at Pittsfield, Mass. It consists of metal balls placed some distance apart between which the flash jumps. In this way 3,000,000 volts were recorded.

CHICKEN AND TURKEY CROSSED

By crossbreeding the chicken and the turkey, a hybrid fowl that withstands cold and other inclement conditions well has been produced in Texas. The new fowl is now being grown by poultry fanciers.

Exhibited at Marcellis Park Dallas 5/27/32

B1032

H. B. Gentle, 1205 S. Waverly Ave., Dallas, Tex. 20.

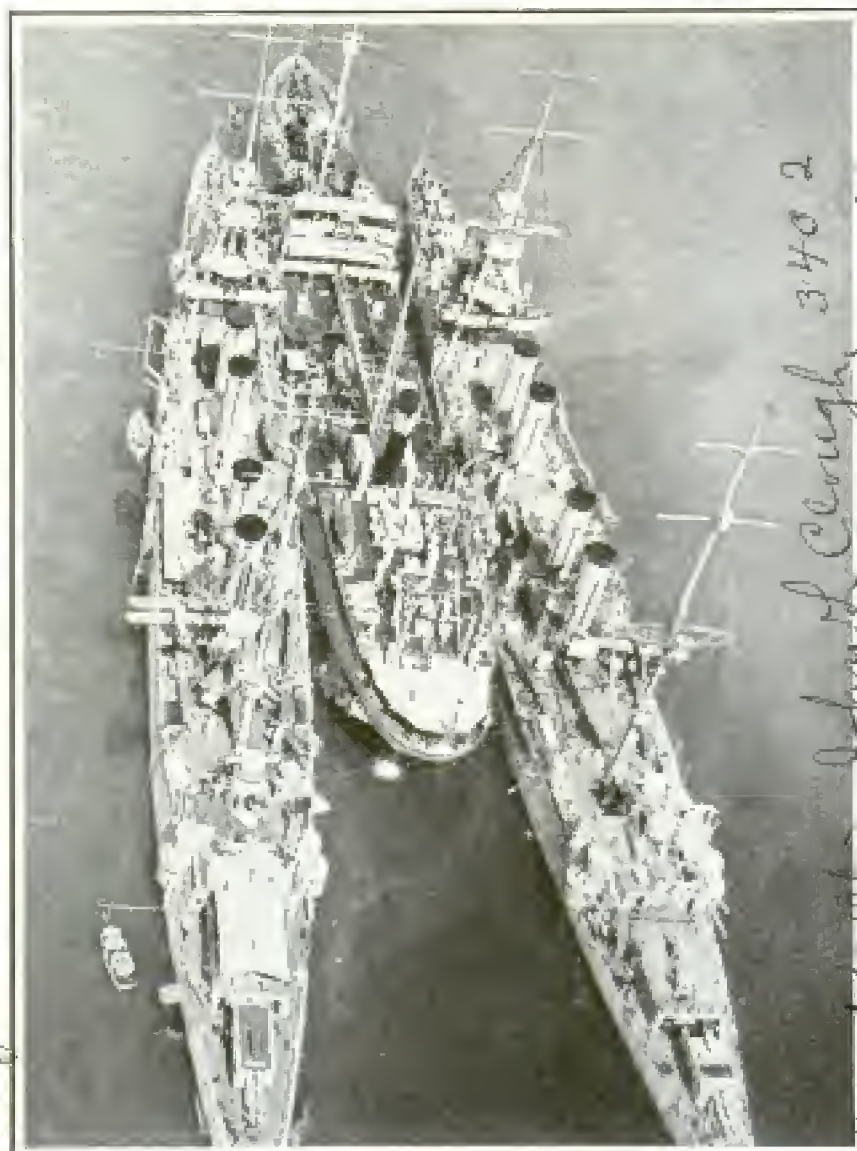
B 981

Taken from Escondido
Bluff, Volunteer

Heri Seal Co. 814 N
Audubon Road,
Indianapolis Ind.

234

U. S. Albatross and U. S. S. Condor
during maneuvers at Los Angeles harbor



This Picture, Taken from the Air, Shows a Supply Vessel in Between, and Transferring Fuel to, Two United States Battleships

U. S. WARSHIPS REFUEL AT SEA DURING MANEUVERS

Playing the game of "war," U. S. battleships had no time to return to harbor for fuel during maneuvers in the Pacific. So a supply ship put out to the big war vessels, throwing out lines to two ships. With one on each side, the supply craft transferred enough fuel for the battleships to continue the maneuvers.

KILLER WOLF SHOTS ITSELF

Trailed for years by expert hunters, a "killer" wolf finally killed itself. Fresh meat on a string tied to the trigger of a rifle attracted the wolf. When he seized the meat, the rifle trigger was pulled, shooting the wolf through the heart.

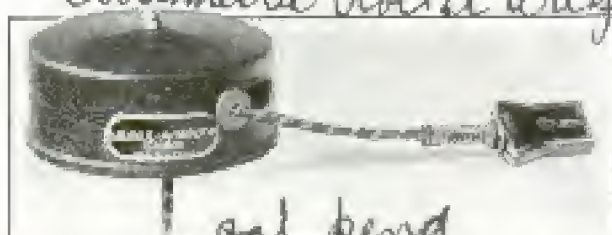
Hunters of Biological Survey, Big Bend district, 1011 W. McHenry Ave. Milwaukee, Wis.

COMPOUND SEALS LEAKY CONCRETE WALLS

Permanent cure for leaky basement walls and floors, without the necessity of exterior excavating, is provided by a newly developed waterproofing compound which may be applied on interior surfaces without reducing its effectiveness. It forms a hermetic seal which is unaffected by temperature or exposure to the elements. It has also demonstrated its value as a binder between various layers of concrete, and eliminates the minute seam which frequently results from interrupted pourings. In resurfacing worn or cracked concrete flooring, the compound acts as an efficient waterproof bond between the old and new surfaces.

ELECTRIC CORD IS SELF-WINDING

While designed primarily for ironing, an electric cord contained in a reel has many other applications about the home. The cord can be pulled out to any length up to ten feet, the unneeded part remaining in the container. By using a three-way plug or a bakelite socket, it can be attached to lamps, heaters, or other household appliances, and also is

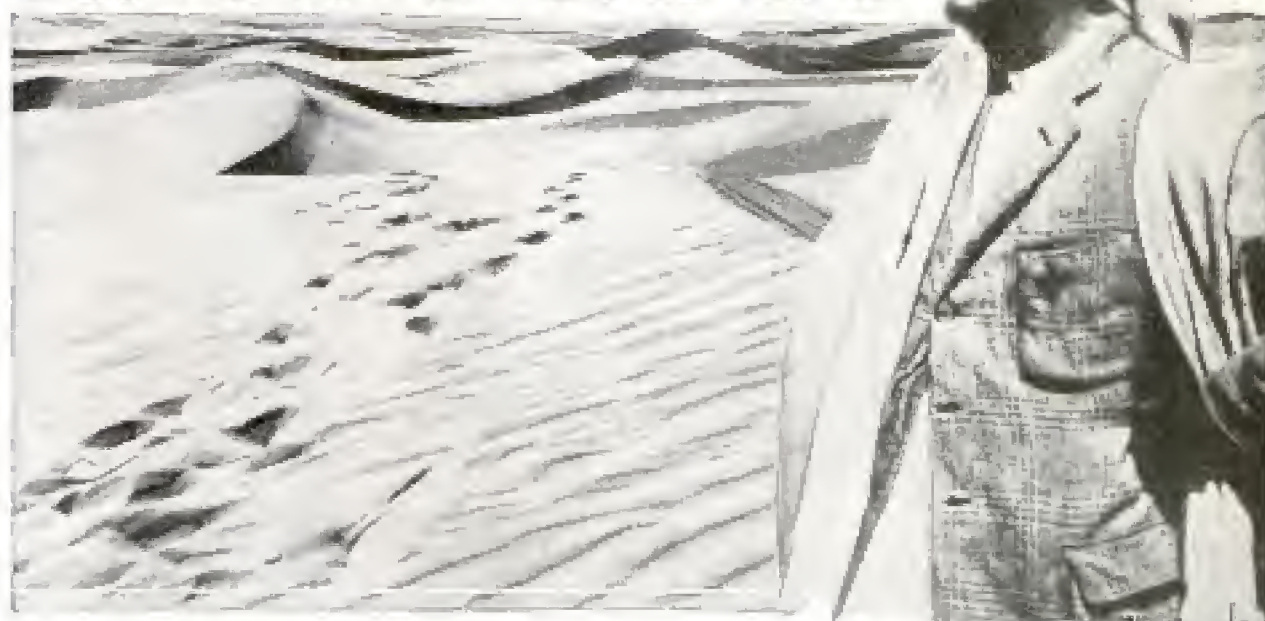


Reel Containing Electric Cord Which Can Be Pulled Out to the Exact Length Needed

handy to use in the garage or around the workshop.

Trico Fuse Mfg Co
1011 W. McHenry Ave
Milwaukee, Wis.

The MYSTERY of the SINGING SANDS



Stretch of Desert Where the Winds That Make the Ripples Also Create the Singing Sands. Right, Bertram Thomas, World Traveler, Who Discovered Singing Sands of Arabian Desert

A DEAFENING shriek of a steamship's siren, far away from ocean lanes, awaits the traveler to the desert of south Arabia. This sound was heard by the noted explorer Bertram Thomas, when he succeeded in crossing this last large blank space on the world's map. To the natives, unfamiliar with steamship sirens, the newly discovered sand is known as the "bel-lowing sand."

Why do sands "sing"? A clue is to be found in the radio broadcasting studio. Sound engineers successfully imitate the rumble of thunder for the microphone by friction of sand grains tumbled over and over in a box. The mike of course picks up the sound of the tumbling sand with greater fidelity than the human ear. The radio apparatus amplifies the sound. Nature, lacking radio tubes, obtains what amounts to the same thing by increasing the size of the chorus; billions of sand grains each do their bit in the wind.

Musical sand is made up almost entirely of clean well-rounded grains of quartz, the glassy mineral of common granite. The wind causes these grains to rub together, setting up vibrations in the surrounding air. The to-and-fro movements

of the grains must be repeated with perfect regularity, to give the vibrations of musical sound.

The number of complete vibrations per second is called the frequency. In order that these frequencies may be recognized by the ear as sound, the number of vibrations must fall between sixteen and 16,000 per second. At the low end of this range are some of the moaning winds, while the chirp of certain insects is found at its upper end. Many quiet sands may vibrate and sing in tones beyond the range of hearing.

The "sound spectrum" or range of frequencies produced by friction of sand grains extends throughout the audible range. This accounts for the fact that nearly every sound and musical instrument known has, at one time or another, been reported in the voice of the desert. There are sopranos among the enchanting sirens of the Odyssey. Sand grains to imitate a soprano must vibrate 240 to 1,152 times per second. The tones of the piccolo extend from within this range to 4,608. Many of the reported sounds are noise. Complex, irregular tones give the sensation we know as noise.

B9 32



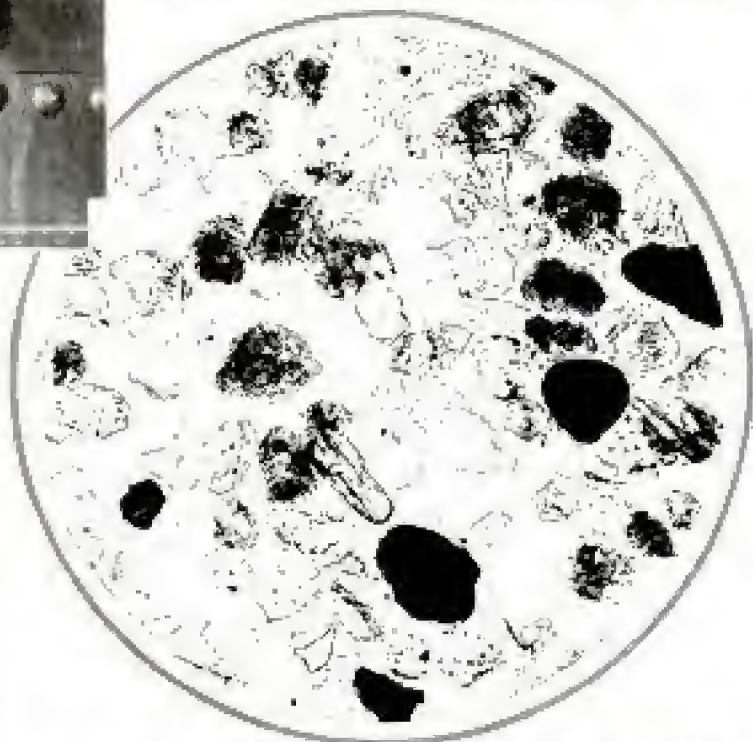
No one has ever measured the intensity of desert voices. The intensity of the world's loudest sound can be estimated very accurately. The farther we are located from the source of a sound, the less its intensity. Thomas was 300 or more feet from the desert siren. The noise-abatement commission of New York City measured a steamship siren 115 feet from its dock in the Hudson. They measured the intensity to be ninety-four "decibels." This name for the units of the intensity scale was derived from "deci," one-tenth, and the name of Alexander Graham Bell, inventor of the telephone. It is easy to understand, because the determination is based on comparisons of ordinary conversation. When exact in describing sound, we say that one sound is more intense than some other well-known sounds. The scientist on the other hand, compares a sound with the least intense sound that can be heard in a quiet place. Rattling paper is one such sound. On his scale it is listed at one decibel.

When the actual comparison is made,

the observer uses a special cap containing a telephone receiver. Tones are produced electrically by a phonograph. The phonograph tones enter the observer's ear along with the sounds to be tested. The cap is slotted in such a way, that the sounds are received together.

The intensity of the phonograph tones is simply adjusted until they are just audible in the presence of the sounds being tested. The measure of the degree of sound present is the difference between this intensity value and one decibel.

If the Arabian sand is considered to give ninety-four decibels of sound, it is louder than the roar of a lion or the deafening sound of an elevated train. Over one billion people rattling papers would



Top, Steam Siren, Which Produces One of Loudest Sounds; Below, How Singing Sands Appear under the Microscope

fail to duplicate this intensity of sound, because they could not get close enough to the ears of the observer.

Sand grains, occupying little space, accomplish what one billion people rattling paper cannot do. As would be expected, all sand grains are not alike. Naturally, the sounds they make are not alike either. Scientists have examined the sand grains with the aid of a microscope. Those from the singing sands of Far Rockaway on Long Island, are fairly rounded. The true prima-donna singing sands of the desert

B964 *Am. Augustus*
A. Arr, 429 1/2 Broad,
St. Louis, Mo.

are considered to be rounded more perfectly than the grains from Far Rockaway.

Among the many interesting theories for the sound is that a thin film of salt on the grains is responsible, because it increases friction. Its action is compared with that of rosin on a violin bow. Another holds that the friction of particles has nothing to do with it; that it is the oscillations of sand particles themselves, protected from actual contact by elastic air cushions, that make the sound.

PICTURE SIGN POSTS POINT WAY IN INDIA *B789*

Sign posts containing pictures direct traffic through the famous Khyber pass in India. Millions in India are wholly illiterate, and it was found that the majority of those traveling the great highway from Afghanistan and Central Asia into north-western India were unable to read any language. For this reason the graphic signs were erected. These posts bear the figures of a camel and a horse on one side and a motor car on the other, thus routing traffic through the pass according to the mode of travel. The highway is policed each mile with blockhouses, and military roads are kept clear for those who guard the pass against lawless tribesmen.



Sign Post in India for Those Who Cannot Read; It Indicates Autos Must Go One Way and Camel and Horse Caravans Another

© Daily Sketch

Walker



When Golf Ball Is Driven against Backstop, Trough Returns It to Tee-Up Position

AUTOMATIC GOLF BALL TEE-UP SPEEDS DRIVING PRACTICE

Speeding up driving practice indoors or outdoors, a teeing-up apparatus for the golfer has been devised. A trough catches each ball after it strikes a canvas backstop and returns it to the tee-up device. One ball is released at a time to roll onto the tee, allowing the player to drive or stand in one position for a thorough work-out. A large room or hall in the home is a good course for night driving or practice.

FERRYBOAT ON TROLLEY WIRE RUNS AT HALF OF GAS COST *B990*

Taking its power from a trolley wire, a ferryboat on a California river operates at one-half the cost of a boat run by gasoline engine. Since the cable had to be dropped to the bottom of the river to permit other boats to pass, engineers of the General Electric company installed special insulation at each end, with a device that automatically shuts off the current when the cable touches the water. This eliminates short circuits. The boat's speed is 180 feet per minute with a load of twelve autos.

*General Electric
 New Canons, N.Y.
 Schenectady, N.Y.*

■The Sahara desert was once a populous country, according to recent discoveries.

Sacramento



Top, Light in Razor Handle Permits Shaving in Dark;
Bottom, Close-Up of the Razor

SAFETY RAZOR HAS OWN LIGHT FOR SHAVING IN DARK

Shaving in the dark is possible if you use a new safety razor that has its own light. Made of bakelite, the razor has a battery and bulb in the handle, which screws onto the head. Bakelite also is used in the razor head, producing a warming effect when placed against the face. Only the blade is made of metal. The light throws its beam around that part of the face on which the razor is being used.

AUTOMATIC SAW TOOTH CUTTER

B-970 Circular-saw and milling-machine blades, worn beyond the point of apparent usefulness, are returned to efficient production by an automatic reconditioning machine. Compact enough for bench use, this grinder handles all sizes of blades from two to sixteen inches in diameter, requires no attention from the operator after the initial setting, and handles blades for both wood and metal working of all standard tooth pitches.

Samuel C. Rogers & Co
191 E. Union Ave Buffalo N.Y.

ROBOT TALKS LIKE SALESMAN AND SHOWS THE GOODS

B1026 Talking and giving demonstrations of the goods, a robot super-salesman has been produced by synchronizing a photo-electric cell with an automatic phonograph and with contact disks that control lights, electric fingers and other mechanical devices. When a person crosses the path of the photo-electric cell, the talking controls are turned on, and the robot starts praising an automobile, electric refrigerator, airplane or some other product. With each remark, the robot gives a demonstration. And the mechanical salesman never listens to objections; never heeds the prospective purchaser's "No!" His sales talk continues until the phonograph completes the record.

QUEER FISH FROM THE TROPICS MAKE AQUARIUM PETS

B3708 Almost as broad as they are long, tiny fish, whose natural habitat is in the Amazon river and its tributaries, are being brought to this country where they appear to thrive in the ordinary home aquarium. They are only a few inches long and are found in great numbers in the River of Doubt in Brazil. The department of commerce aquarium at Washington recently imported several of them for exhibition purposes.



Rare Species of Fish from Amazon River Which Has
Been Found to Thrive in Home Aquarium

His Hobby Is Collecting of Animal Tracks

Collecting the tracks and imprints made on sand beach and mud flats by birds and animals, and immortalizing them in cement blocks forming a garden walk in the backyard of his home, is the unique hobby which fills the spare moments of Charles A. Urner, of Elizabeth, N. J. More than sixty specimens are so far included in the garden walk,



Cement Slabs Containing the Imprints of the Feet and Claws of Many Animals and Birds; at Left Are Tracks of the Blue Heron

which is now about forty feet long. Here's the way it's done. Armed with a pair of binoculars, a collapsible pocket-size stove, a supply of "canned heat," and a lump of paraffin, Mr. Urner sets off on his hunt. Espying an animal or bird track that looks

interesting, he melts the paraffin and pours the liquid into every detail of the track. The paraffin quickly hardens and thus becomes a cast. This is then gently pressed against the soft cement of the walk, where it remains overnight. In winter, when there is snow on the ground, hot paraffin is of course out of the question, and plaster of paris, heavily impregnated with common salt, which causes the plaster to set almost instantly, takes its place.

RACE-CAR GARAGE ON WHEELS SPEEDS REPAIR WORK

B993 Speeding up repairs at the race track, a garage on wheels has been built for Earl Howe, English driver. A van body fitted on a six-cylinder chassis carries a completely fitted workbench, spare parts and electric lights for night work. In addition, it has room for Howe's racing car. Removable floorboards, beneath the "nest" where Howe's speedster is carried, permit a mechanic to stand on the ground under

the van and make repairs without bending his back.

FASHIONS IN JEWELRY CHANGE WITH SHORTAGE OF GOLD

B995 With England melting all available gold to increase her reserve, British jewelers have developed ornaments of chromium plate. Bracelets, earrings, etc., are being made of this metal. Another novelty is brooches of chinaware, embossed with tiny floral designs in pastel shades.

same —————> Cont. U. E. Barnes, c/o Herald and E. Barnes, Chicago

0367 CHUTE IS GUIDED BY "PROP"
 RUN BY PEDALS

Propeller Operated
 by Feet Which
 Guides a Descend-
 ing Parachute



Courtesy St. Petersburg
 Chamber of Commerce

In order to direct his course after leav-
 ing an airplane, one parachute jumper has
 made a propeller which he operates with
 his feet as he descends. The propeller is
 attached to a light block which is strapped
 to the jumper's body. It is operated by
 cords attached to stirrups and running
 through small pulleys. By pedaling the
 propeller, the jumper can in a measure
 direct the course of his descent to avoid
 water or other unfavorable landing places.

031043 RAW RUBBER TO KINDLE FIRES
 COSTS LESS THAN WOOD

Raw rubber is being used for kindling
 fires at less cost than wood. Many Brit-
 ish homes are lighting open fires with
 strips of raw rubber, enough being cut
 from one pound, costing five cents in
 American money, to kindle seven or eight

fires. Although not generally realized,
 crude rubber burns easily without an of-
 fensive odor. This new use of rubber is
 being encouraged by the industry in an
 effort to dispose of the excess of the ma-
 terial that depressed prices below the cost
 of production.

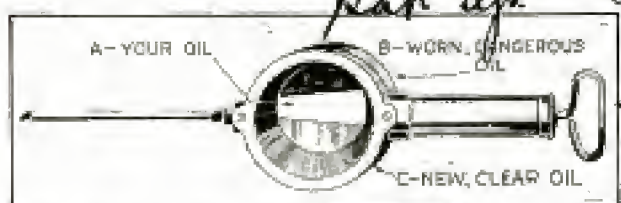
Science Service 5/26/32

031039 CENTER OF EMOTIONS IS FOUND
 IN LEFT HALF OF BRAIN

Headquarters for the emotions have
 been tentatively located by Dr. Leland B.
 Alford as resting at the base of the left
 half of the brain. This conclusion was
 reached after a study of patients whose
 brains had been injured. When the lesion
 occurred on the right half of the brain,
 even if the injury was extensive, the pa-
 tient appeared conscious and his emotions
 were normal. Even when the left side of
 the brain was injured, there was no ap-
 parent confusion in the patient's mind,
 unless the injury was at the base of that
 side. Of thirty patients who were par-
 alyzed on the left side, due presumably to
 a lesion on the right side of the brain, not
 one showed confusion of consciousness.
 Of fifty-five suffering from right-sided
 paralysis, indicating left-brain injury, half
 were confused. Doctor Alford hopes to
 offer more proof by finding, in examina-
 tion after death, actual destruction of or
 injury to the tissues at the base of the left
 side of the brain.

03876 CAR OIL TESTER HAS WINDOW
 TO INSPECT LUBRICANT

Faster and more accurate testing of mo-
 tor oil is possible with an instrument that
 draws a sample from the crankcase and
 displays it as a thin film in a tiny window.
 For purposes of comparison, color repro-
 ductions of new oil and dangerously worn
 lubricant appear at either side. The con-
 dition of the oil is made plain much more
 quickly than by older methods.



This Device Draws Oil Sample from Crankcase; Win-
 dow, at Center, Permits Inspection

Oil Tester Corp.
 Burnside St. Portland
 Ore

as finding of American
 psychomotor aberr.
 Portland
 developed by W. A. Crowlley
 and G. W.

Aug



not Sargent's name

© Marconi Wireless Telegraph Co.

Natives Operating the Tandem Pedals to Furnish Power for a Radio System in Rhodesia; the Pedals Drive a Generator and the Natives Enjoy the Novel Form of Exercise

TWO-MANPOWER GENERATORS RUN RADIO IN WILDS

In order to link up many isolated administrative posts in northern Rhodesia with each other and with government headquarters, short-wave radio communication has been established with power derived entirely from tandem pedal-driven generators. These generators supply both high and low-tension circuits. Voltmeters are fitted on each handlebar, but they are marked at only one point, and the natives are instructed to pedal at a speed that will keep the needle at the mark. An aircraft transmitter of 150 watts with a wave range of forty to sixty meters and a receiver with a range of ten to 200 meters compose the wireless equipment, which maintains communication for distances up to 500 miles even under difficult atmospheric conditions.

U. S. LEADS WORLD IN RADIO

With 16,679,253 radio sets, the United States leads the world in the number of receivers in operation. The Union Internationale de Radiodiffusion, Geneva, estimates there are more than 32,000,000 sets

in the world, with an approximate audience of 128,000,000 persons. Present estimates for the United States indicate an increase of more than 4,000,000 receivers in the past two years as the number of sets in use here in 1930 was 12,078,345. Denmark has more sets than the United States, based on population, as there are 133.9 receivers per 1,000 persons, while in this country the ratio is 133.1 per 1,000.

FACTS ABOUT GREAT INVENTORS TOLD IN MOVING DIAL

Forty inventions and the names of the inventors are listed on a chart designed as an educational aid. By turning the pointer to any invention, the inventor's name is presented in a slot. On the reverse side is a similar device that lists the wonders of the world and answers questions about them.



B 8 58

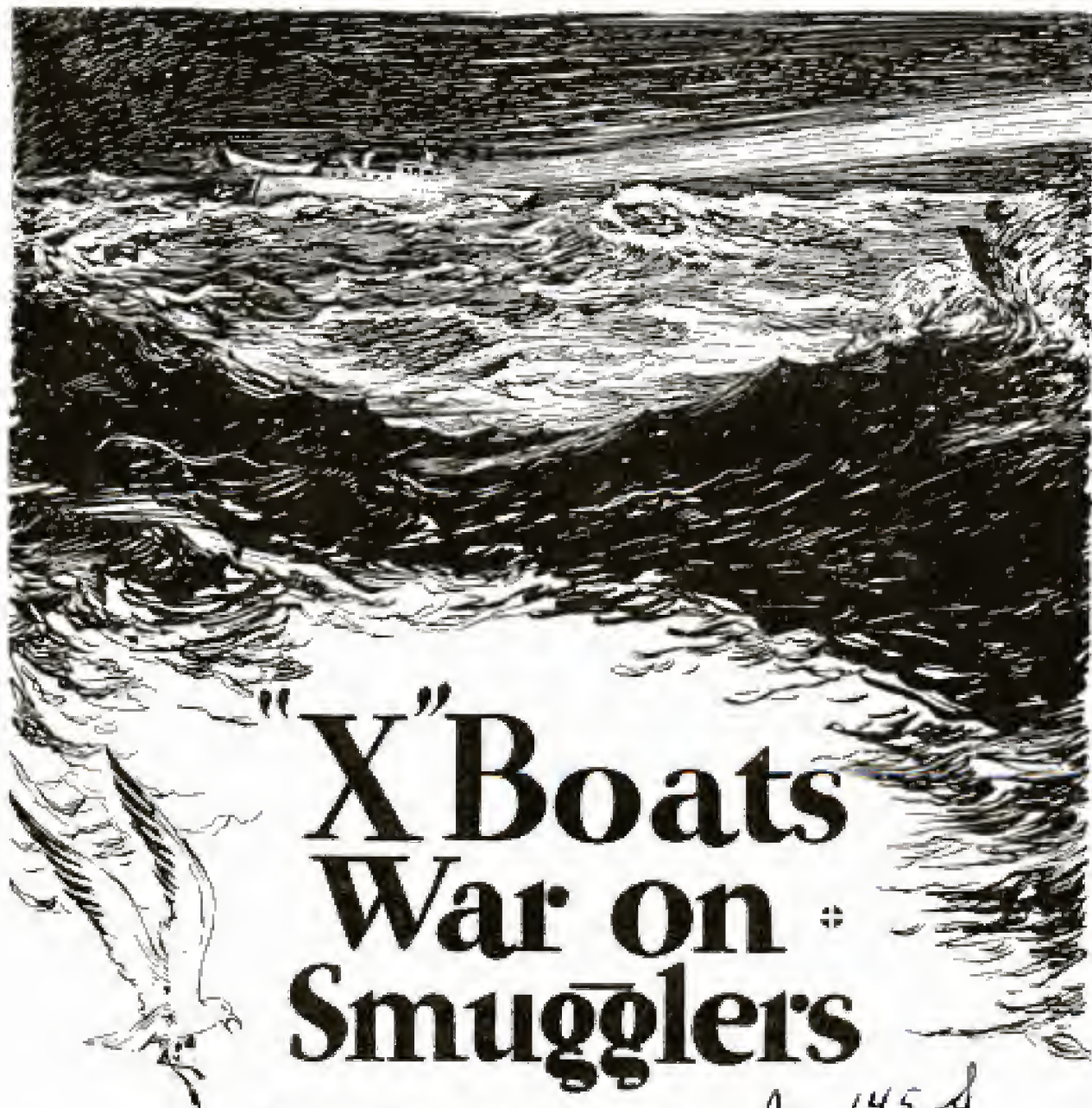
A Knapp,

96 Fifth Ave New York

Pres memo 5/10/32

A. R. Burrows, Secy.
by Radio & Wireless of Commerce

B982



"X" Boats War on Smugglers

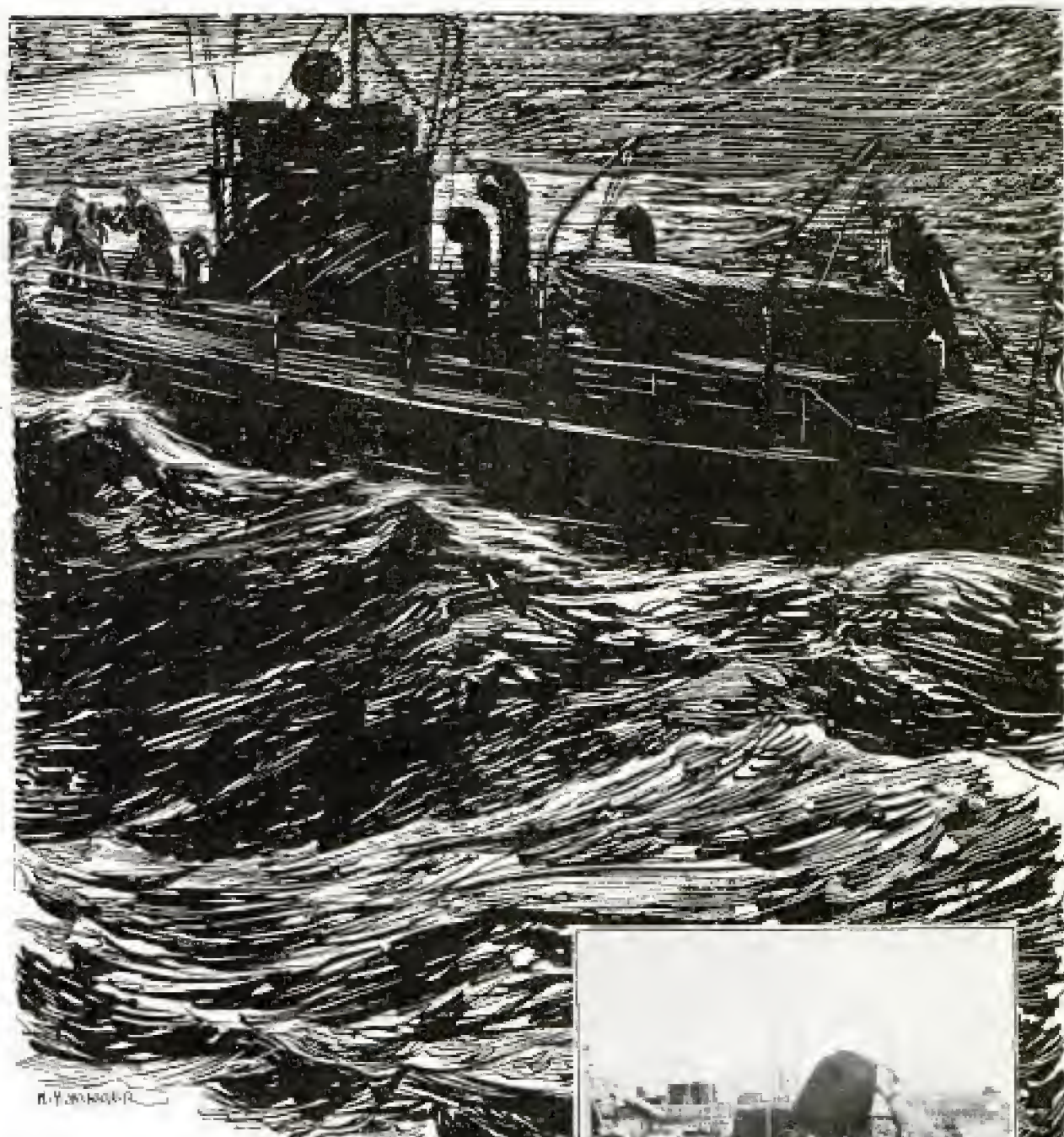
By THOMAS E. STIMSON

Spring St. Los Angeles Calif. 145 S

RUM smugglers who dash through the night in fast speed boats are now being chased by mystery craft that reveal themselves at the last minute as members of the new secret fleet of the coast-guard service. The mystery boats, painted a dull gray to make them as invisible as possible, and driven by powerful racing engines, are proving most effective in hampering the smuggling of contraband to the shores of the United States.

Curiously enough, the secret fleet is made up of former "rummies" that have been captured and converted by the coast guard. The movements of the boats are shrouded in secrecy. Ready for sea twenty-

four hours a day, they can cast off at once when a cryptic message is flashed by radio from a patrol cutter or is relayed from under-cover sources. Manned by picked men, the boats speed off on duties that may require a few hours or several days. Comm. Muller S. Hay, in charge of the "X" boats on the South Pacific patrol, credits many recent captures to the mystery craft. "These boats were especially built for running contraband," explains Commander Hay; "hence they are just as ideal for capturing smugglers as for smuggling itself. They are staunch seaworthy craft that can push through the roughest weather. Usually they are



powered with three converted Liberty airplane engines, or the equivalent, a matter of 1,100 or 1,200 horsepower. Carrying a \$25,000 cargo of liquor, such a smuggling boat can make thirty miles an hour at sea. Unloaded, they are somewhat faster. That extra speed is enough for us to overtake a 'runny' that is loaded.

"When information is received that a cargo is to be landed, one of the speed boats is sent to sea with orders to bring the smuggler in. At night it's a game of hide and seek, for neither the coast-guard boat nor the smuggler shows any lights. If the smuggler is discovered, the mystery



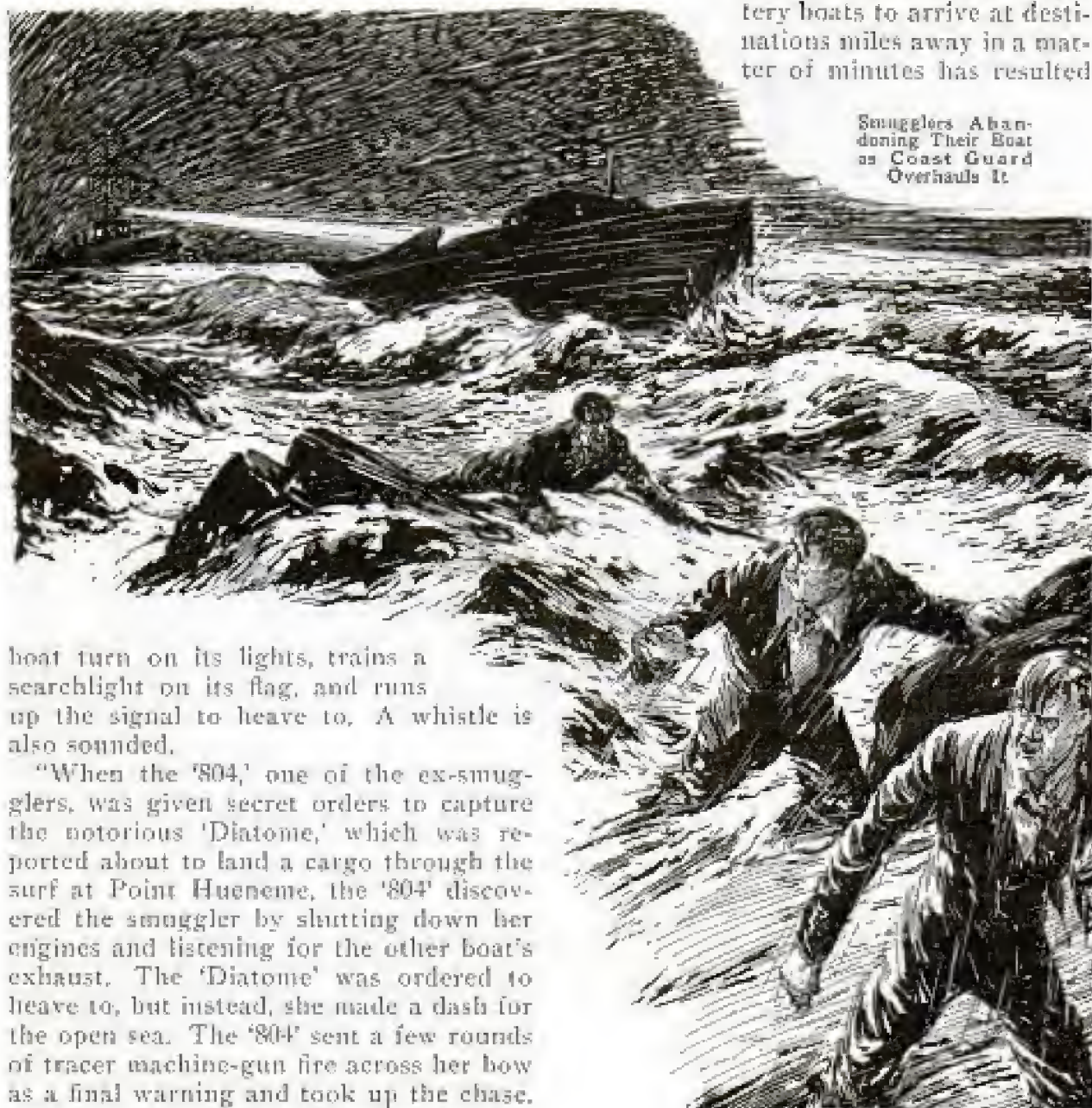
Unloading Sacks of Liquor from Captured Speed Boat



Intermediate Smuggler Receiving Contraband Cargo from Mother Ship in Preparation for a Dash to the Shore

After more than an hour of dodging through the waves, the coast-guard vessel disabled the smuggler with machine-gun fire. The 'Diatome' was one of the fastest run runners on the west coast, and since she was confiscated, she has made a few captures herself."

Units of the secret fleet are stationed at every coast-guard base on the Atlantic and Pacific coasts. So effective is the fleet that additional speed boats are being built to augment its numbers. The ability of the mystery boats to arrive at destinations miles away in a matter of minutes has resulted



Smugglers Abandoning Their Boat as Coast Guard Overhauls It

boat turn on its lights, trains a searchlight on its flag, and runs up the signal to heave to. A whistle is also sounded.

"When the '804,' one of the ex-smugglers, was given secret orders to capture the notorious 'Diatome,' which was reported about to land a cargo through the surf at Point Hueneme, the '804' discovered the smuggler by shutting down her engines and listening for the other boat's exhaust. The 'Diatome' was ordered to heave to, but instead, she made a dash for the open sea. The '804' sent a few rounds of tracer machine-gun fire across her bow as a final warning and took up the chase.

in a literal blockade through which smugglers have less chance to operate than formerly. Last fall the steamer "Marabella" lurked off the Pacific coast for weeks, seeking an opportunity to land her cargo of 100 Asians and \$1,000,000 worth of dope. She failed to find an unprotected area and finally landed it on an island off Mexico.

Smugglers have resorted to new dodges since the secret fleet became active. The ex-"Diatome" recently discovered a suspicious-looking craft running without lights in Santa Monica bay. The coast-guard vessel kept her in view with a searchlight, and after a short chase, the strange boat stopped. She proved to be empty. But during the chase the pursuers had noticed black objects disappearing into the water at frequent intervals from the stern of the boat. An investigation showed that the boat had a false stern transom which pulled up, exposing a large cargo compartment. The bay was dragged with grappling hooks



Coast-Guard Cutter in Foreground Preparing to Intercept One of Intermediate Boats Plying between Mother Ship and Shore

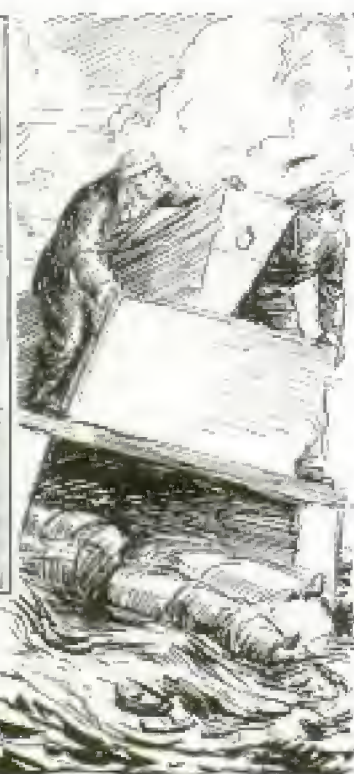


One of the Intermediate Smuggling Boats; Ties Along the Side Are Used as Penders When Alongside the Mother Ship

13394



Three Members of the Secret Fleet, All Once Used for Smuggling and Converted to Coast-Guard Use after Capture



and eighty sacks of liquor, attached at five-foot intervals to a strong line, were recovered. By means of the false stern it had been possible to kick several of the sacks overboard, the drag of the water at full speed pulling out the balance of the cargo. Other boats have after cargo holds arranged so that the liquor can be jettisoned through doors that swing on hinges.

"Smugglers that are hard chased often

throw lengths of rope overboard," said Commander Hay, "in the expectation that the rope will foul the propellers of the coast-guard craft. One of the mystery boats once was chasing a suspect when suddenly the latter stopped, her crew hastily set the dory adrift and jumped in, and simultaneously the boat became a mass of flames. The smugglers had thrown a bucket of gasoline into the bilge, set it

afire and escaped. They knew that the coast guard would pick them up and that their boat, with its incriminating cargo, would burn to the water's edge. Pursued smugglers sometimes open up their sea cocks to sink their boats or run them onto sunken reefs so that the boats and evidence are lost. When a smuggler is discovered at night on a rocky coast, he sometimes dashes at full speed toward the shore, to turn at the last possible moment in the hope that the pursuing vessel will make a wider turn and strike the rocks.

"A professional smuggling speed boat has certain distinctive features that give her away even before she is caught.



Coast Guards Searching a Fishing Boat; in This Case 700 Sacks of Liquor Were Found Hidden under the Net

B 4 62 Goodrich Rubber Co
 Sundry Dept.
 San Francisco 247
 Calif

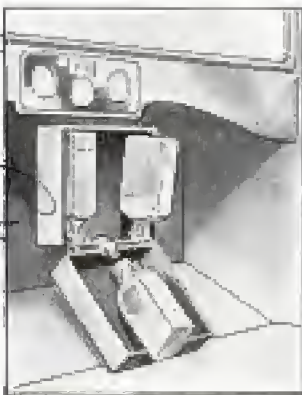
POPULAR MECHANICS

Until we get the goods on a boat, it remains a suspect, to be watched on every occasion. Sometimes we know that a boat is to be used for running liquor even before she has been built. A typical smuggler is forty or fifty feet long, has a big dory across the stern for carrying cargo through the surf, a small pilothouse forward, flaring bows, and powerful engines out of all proportion to her size."

International laws have changed the status of liquor smuggling so that the rum rows of the past are no longer so much in evidence. On the west coast the mother ships, which are actually floating warehouses, lie at permanent moorings off the Mexican coast. The Canadian law prohibits the shipment of liquor to these ships and requires that every cargo leaving port go out under bond. The contraband is now shipped to Tahiti or some other convenient South Sea destination. After it has been landed, the bond is released and the liquor is then trans-shipped in trading schooners to the floating warehouses. Intermediate boats are then employed to carry the rum north.

WATER KEPT IN AUTO BATTERY BY AUTOMATIC FILLER

Operating on a gravity air-vent system, an automatic filler keeps the water level of the automobile battery above the plates at all times. The filler occupies a



bakelite case under the dash and consists of three bottles of distilled water, one for each cell. The bottles operate on hinges and a water and air hose leads from each, the rubber sections being combined in one cable running to the battery. When the water falls below the set level, the supply from the bottles is automatically drawn into the battery. Each cell is fitted with a rubber cap containing an air vent. Empty bottles can be replenished by pulling them forward on their hinges and disconnecting them.



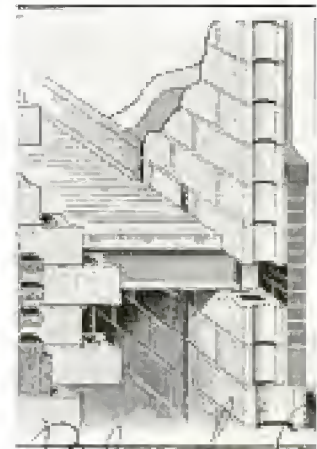
This Appearance of Well-Dressed Hair Is Provided by a New Bathing Cap of Molded Rubber

BATHING CAP LOOKS LIKE HAIR BUT IS MADE OF RUBBER

Modeled to look like a sleek hairdress, a bathing cap made of rubber is now on the market. It fits closely over the wearer's head, keeping the real hair in and the water out. In addition to its usefulness as a bathing accessory, the cap gives the wearer a well-groomed appearance in the water and on the beach and has found favor at Pacific coast resorts.

BRICK THAT WILL HOLD NAILS WEIGHS LESS THAN TILE

Bricks into which nails may be driven have been introduced as a building material for backing up masonry walls. Fire-proof and weighing twenty per cent less than hollow tile, the bricks have good insulation properties. The manufacturers claim that use of these bricks will save on mortar, stucco, lath, furring materials, nailing plugs and strips and insulating material. Heat-treated clay or shale expands, forming minute air cells to give the brick lightness and uniformity.



Law. A. H. Mosher Westfield N. J.

Evelo Molding Co
 Westfield N. J.

John H. Black Co.
 505 Delaware Ave
 Buffalo, N. Y.



Demonstrating Use of Compensator on a Gun; Note Gases Emerging from Ports Before Bullet Issues from Muzzle

"JUMP" IS TAKEN OUT OF GUNS BY CYLINDERS ON MUZZLES

Tendencies of guns and pistols to overshoot the mark on account of an upward thrust of the muzzle at the instant of discharge have been overcome by means of

a cylinder, or compensator, which is attached to the muzzle of the weapon. If an automatic were aimed at the basement of a building and twenty shots were fired without effort to correct the "jump," it has been calculated that the last shot would be hitting the sixth story. The compensator is a cylinder into which ports or slots are milled, pointed upward and backward. Photographs of firing tests show that in the fraction of a second between the ignition of the charge and the exit of the bullet from the muzzle, a cloud of gas is expelled at high speed, causing a vacuum above the muzzle and thus throwing it up. With the compensator installed, this gas is expelled through the ports, upward and backward, counteracting the recoil and the upward climb of the muzzle. The device can be used on small arms, machine guns and ordnance but is particularly valuable for anti-aircraft weapons. Range records show that the time spent by marksmen in becoming accustomed to the recoil is greatly reduced with the use of the compensator.

B950

ROBOT TALKS TO FIRE VICTIMS AND POINTS WAY TO ESCAPE

Talking in a calm voice, an automatic fire alarm warns its audience of the presence of flames and directs the way to the nearest exits. By means of electrical devices, the system combines an automatic fire detector with a music reproducer that is connected to loud speakers. The system responds to heat in three ways, sending an alarm to the nearest

fire station, directing the firemen to the side of the building nearest the fire, and turning on lights at the front of the building to show firemen the particular part of the building where the fire is located. At the same time, the robot turns on the music reproducer, and a flare of trumpets

Western Electric Co. Engineers
50 Church St. New York

Cont. R. S. Chapin, 207 Main St. New York, N. Y.

detecting system
and (escapism) fire
207-5th Ave New York

comes from the loud speakers. In addition, green arrows light up, pointing to the exits. After the trumpets sound, a calm but commanding voice, produced by a record, says: "There is a fire emergency, but no immediate danger. You must leave the building. You are drilled in this and know just what to do. Leave your hats and coats, take your places in line. Steady now, don't rush. Follow the green arrows." A band strikes up a martial air and the sound of approaching sirens is heard. The record, in this case, is designed for use in school. With variations, it could be used in theaters, churches, auditoriums and similar places. Everything in the record has a definite purpose. The band piece is chosen for its strong marching rhythm. The siren is injected so the listeners will not be frightened when the real sirens are heard outside as fire engines arrive.

B830

SINGLE-WHEELED CABIN PLANE HAS CONTROLS IN CEILING

Landing shock of a new metal plane is absorbed by one large wheel set under the center of the fuselage, instead of the customary split-type gear. For taxiing and standing, small wheels on swivels are fastened to the wings. These prevent the plane from falling on one side. Controls are set in the ceiling of the cabin, instead of in the floor, and the craft is flown from the right side instead of the left.



Note the One Large Landing Wheel on This Plane; Small Wheel Helps Steady the Ship in Standing Position

Designed by Charles W. Hall
Buffalo, N.Y. tested at
Huntingdale, N.Y.

Splitting the Soles of These New Shoes Revealed Prison Delivery Tools



clnt

X-RAY FINDS JAIL-BREAK TOOLS IN SHOES SENT TO CONVICT

By X-raying all packages sent to prisoners, authorities at the District of Columbia jail discovered a set of tools to be used in a break for freedom. Two small saw blades and a file were found concealed within the soles of a pair of shoes made to an inmate.

INDIVIDUAL SOUND BOX FOR PIANO STRINGS IMPROVES TONE

B974

To produce a tone in a small piano like that of a concert grand, one manufacturer has fitted the instrument with a box which lies at one end of the sounding board and over which the wires are stretched. The principle is the same as stretching the wires over a violin, guitar or other stringed instrument. The box is arranged so that there is a small tone chamber under each string. It provides an air space, which picks up the individual vibrations as the strings are struck and amplifies the tones.

Chas F. Stein
3047 Carroll Ave
Chicago

B959. Coleman Motors Corp.
 Littleton, Colo

250

POPULAR MECHANICS

Rear Engine and Front Drive in Same Auto

Freedom from engine noises and fumes and non-skid protection are provided in a new-type automobile that has a rear motor and a front drive. Three passengers may occupy the front seat



Front of Auto; Side View, Above, Shows Radiator Located at the Rear

comfortably, while the rear seat has room for four. The car has a low center of gravity, resulting in safety at high speeds. While the width between the wheels is standard, there are no running boards, the passenger compartments extending the full width. Fully streamlined, the car has a speed of eighty-five miles an hour. Spare tires, battery and thirty-gallon gasoline tank are all in front, carrying out the general reversal of arrangement. Weight is almost evenly divided, the rear being only five pounds heavier than the front. Though lower than most autos, this car has fifty-one inches of headroom.

CHEAP HOMES MADE OF STEEL TO HOUSE UNEMPLOYED

Cheap homes of steel, easily erected, will house Germany's unemployed and their families. Material costs for the houses amount to about \$530, while three unskilled workmen can put up a home in a week, after the cement foundation has

set. The house is a one-story structure with a combination living room and kitchen, two bedrooms and a workroom. Walls and roof are made of steel sheets set on sheet-iron base strips on the foundation and bolted together. The sections are fastened to the foundation by anchor bolts cemented in. Floor, ceiling, doors and roof framing are of wood. Window and door frames are of steel, bolted to the walls. Layers of brick, made of volcanic ash, cement and limestone, form a lining for the inside walls, with building paper placed behind the brick. The roof is of galvanized-steel sheets. German authorities plan to build these houses on unused land near the cities. Each home will have a garden plot.

WRENCH IN HALF-MOON SHAPE WORKS AROUND CORNERS



Shaped like a half moon, a new wrench reaches around the corner to turn automobile-starter and other bolts and nuts that must be reached by passing the tool around obstructions. The

tool has a nine-sixteenths-inch opening at one end and a five-eighths-inch opening at the other, fitting nearly all bolts on standard auto starters.

Cornwell Quality Tool Co.
 Mogadore, Ohio

Card. Frank Conly, 986 S Pennsylvania St Denver, Colo

B983
 5/14/32

Report of Vice Consul George
 Meyer, Cologne.
 Dept. of Commerce

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Schenectady, ny - 03797

FINS PROPOSED FOR BIG LINERS TO PREVENT ROLLING

Ocean liners may be prevented from rolling by equipping them with large fins controlled by a delicate gyroscope. This is the proposal of Dr. E. F. W. Alexander-son, of the General Electric company, who would utilize a small gyroscope to operate thyatron vacuum tubes which in turn would control large currents to motors operating the fins. The fins tilt up or down, according to the roll of the ship, very much as the wings of a seagull which keep the bird in perfect balance. Thus if the ship is inclined to roll to one side, the fins would immediately be tilted down on one side and up on the other. By turning the model upside down, it was found possible to make it imitate the balancing act of a tight-rope walker. It has been found the fins would not greatly slow up the speed of a ship when the stabilizer is not in use, and when in operation the loss of time would be compensated for by keeping the vessel balanced.

Control

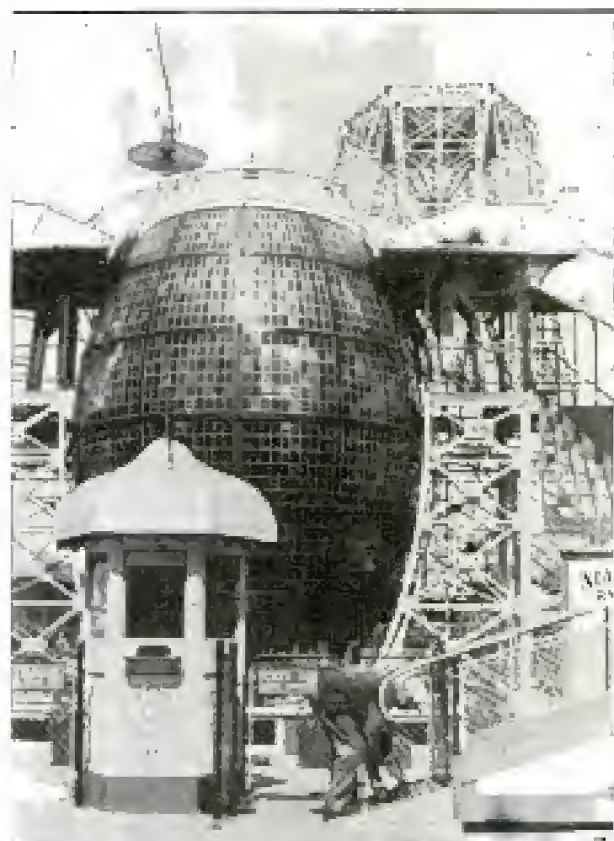
FINGER-TIP-SIZE STEAM ENGINE HAS IOTA OF POWER

So small that it can rest on the tip of your finger, a steam engine with .00075 horsepower has been produced. The power is too small for any practical purpose. One-hundred pounds' steam pressure is used to operate the engine, which has a five-eighths inch flywheel.



Small Enough to Rest on a Finger Tip, This Steam Engine Actually Produces Power

Built by E. H. Vincent
Caterpillar engineer, San Leandro
Calif.



Huge Glass Barrel Which Revolves as Riders of an Amusement Device Turn in Opposite Direction

SPINNING BARREL GIVES THRILL OF GOING OVER NIAGARA

Persons who would like to know how it feels to go over Niagara falls in a barrel without actually making the trip can enjoy some of the sensations by taking a ride in an amusement device at Venice, Calif. The main attraction is a giant barrel, forty feet tall, made of colored glass with water beneath it which is seen through the glass. Eight persons sit in a car, the seats of which turn upside down inside the barrel, while the barrel itself turns over in the opposite direction. Most riders emerge from the experience dizzy and with enough thrills to last for the day.

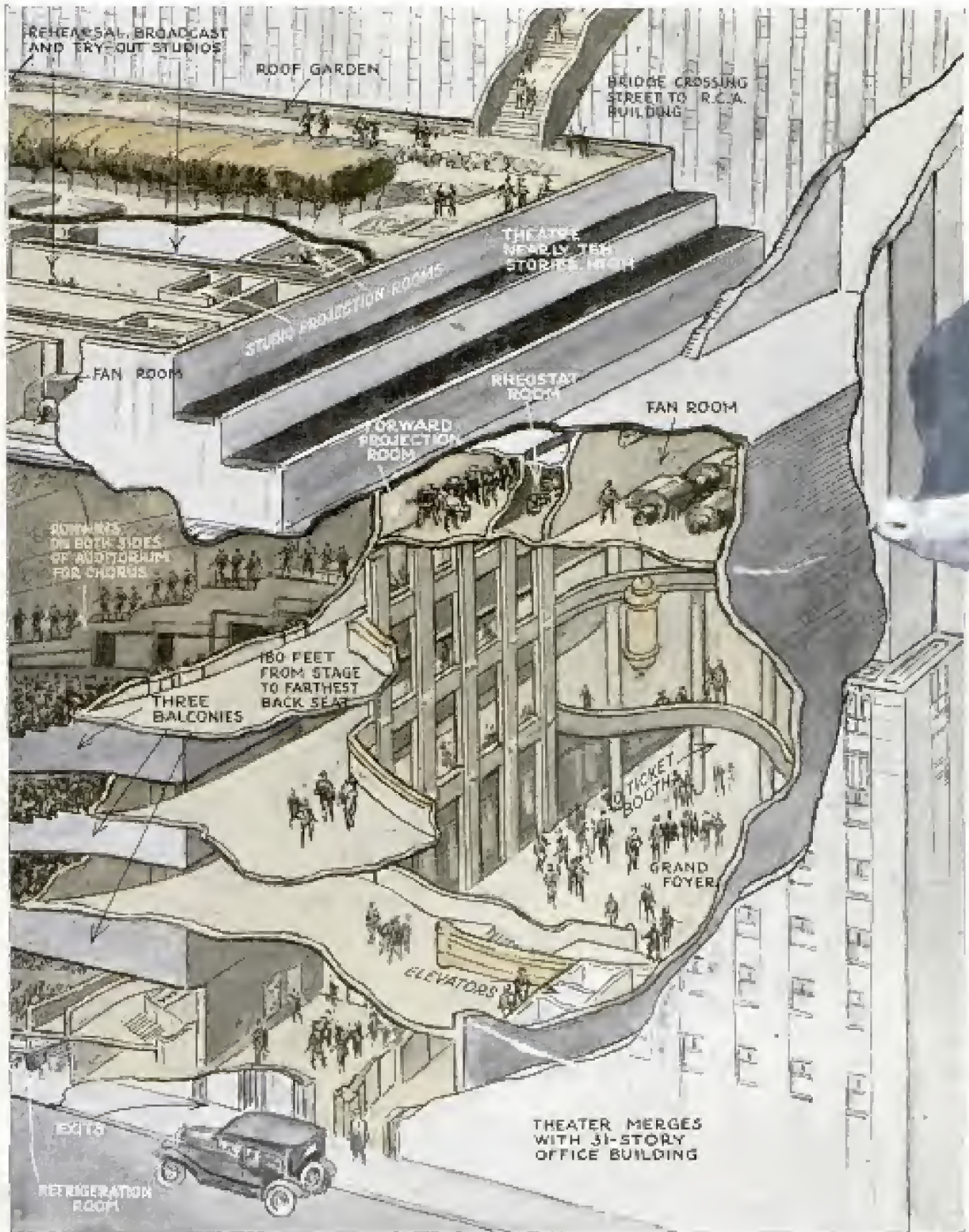
SILENT CHURCH SERVICES

No organ is ever played, no hymns are sung and no words are spoken in one English church attended by about 100 persons for each service. It is at Newcastle and is known as the "church of the silent service." Worshipers are deaf-mutes and conduct their devotions by lip reading, the deaf-and-dumb alphabet and signs.

Cons. V. & Barnes
% Herald and
Examiner Chicago

at meeting of American Society of Naval Engineers
dys. Harry W. Hargreaves
% American Engineering
Entertainment Service, Calif.
Cart. 0. L. L. 12.95 Portland, Me.
Thornton, Conn.

Center Will Seat Six Thousand Persons



Note Revolving Central Stage and "Band Wagon" on Which Orchestra Can Be Moved from Position in Front to Place on Stage; the Stage²⁰⁰ Triplicate, Can Be Elevated Thirty-Two Feet

B 7 58 Cml. John C. Reinhardt
944 Marjorie

254

POPULAR MECHANICS

Los Angeles, Calif.

Pictures Taken While
Movie Actress Dances
with the Camera Give
the Audience the Im-
pression That They Are
Dancing with Her



ROBOT MOVIE CAMERA DANCES WITH ACTRESSES

Adjustable for a waltz, foxtrot, tango or straight-walking, a robot movie camera has been designed for photographing the film stars as they dance. The mechanical dancer, electrically driven, guides the actress around the floor, taking her picture in such a way that audiences get the impression of dancing with her. Dress details, a chalked face on the camera and wooden arms give a realistic touch.

■Africa is planning the world's longest bridge, 11,650 feet, all of it over open water of the lower Zambezi river.

IMPORTANCE OF CHANCE IN PROGRESS

B. 911

Nature has her own ways of telling her secrets to man, and the commonest of these ways is what man chooses to call chance or accident. An alchemist, seeking to discover a mixture of earths that would make the most durable crucibles, one day discovered that he had made porcelain. The power of lenses, as applied to the telescope, was discovered by a watchmaker's apprentice. While holding spectacle glasses between his thumb and finger, he was startled at the suddenly enlarged appearance of a neighboring church spire. The art of etching upon glass was discovered by a Nuremberg glass cutter. By accident a few drops of aqua fortis fell upon his spectacles. He noticed that the glass became corroded where the acid had touched it. Mezzotint owed its invention to the simple accident of the gun barrel of a sentry becoming rusty with dew. The swaying to and fro of a chandelier in a cathedral suggested to Galileo the application of the pendulum. The art of lithography was perfected because a poor musician was curious to know whether music could not be etched upon stone as well as copper. The composition of which printing rollers are made was discovered

by an English printer. Not being able to find the pelt ball, he inked the type with a piece of soft glue which had fallen out of the pot. It was such an excellent substitute, that, after mixing molasses with the glue to give the mass proper consistency, the old ball was discarded. The process of whitening sugar was discovered in a curious way. A hen that had gone through a clay puddle went with her muddy feet into a sugar house. She left her tracks on a pile of sugar. It was noticed that wherever her tracks were, the sugar was whitened. Experiments were instituted, and the result was that wet clay came to be used in refining sugar. It was an accident that led to the discovery of transferring

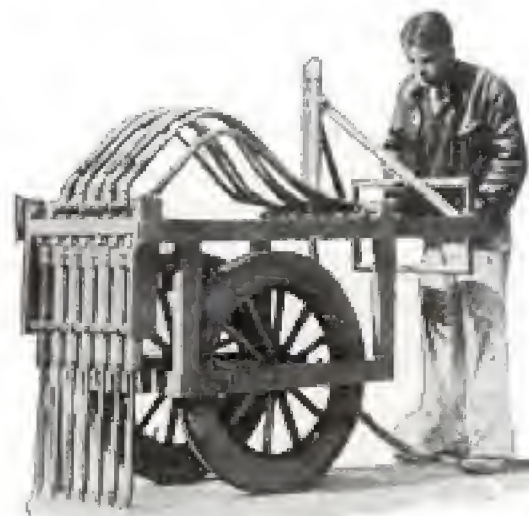
Emb. Everett
1729 N. Cal
L.C.

Paramount

handwriting to iron. A founder accidentally dropped a ticket into a mold. He presently found that the type of the ticket was transferred to the iron. Then he procured a heat-proof ink, with which he wrote invertedly on ordinary white paper. This paper was introduced into the mold before the molten iron was poured in. When the mold cooled, the paper had been consumed by the heat, but the ink had left a clear impression on the iron.

HAMMER BATTERY SPEEDS CONCRETE WORK *B.C.*

Air hammers, mounted on wheels, are being used to speed up the roughening of concrete floors for the finishing coat of cement. One man, operating one battery, does the work of a large crew using the hand method. In order that the finishing cement may adhere to the concrete underneath, the rough spots must be prepared. The shortened axle of an automobile is used for mounting the air ham-



Battery of Air Hammers Preparing Concrete for the
Finishing Layer of Cement

mers, with the pneumatic-tired wheels left in place for rolling over the floor.



Workmen Are Shown Putting Together the Thirty-Three Panels of This Photo of the Chicago Fair: It Is Said to Be the World's Largest

LARGEST PHOTO GIVES BIRD'S EYE VIEW OF FAIR

Assembled from thirty-three panels, a photograph of the world's fair grounds is said to be the largest ever used in mural decoration. The photo was made from a painting by H. M. Pettit. It will be exhibited in the administration building at the Century of Progress in Chicago. The mural is twenty feet high and thirty-five feet wide.

"FLOATING BACK" TO HEALTH NEW ARTHRITIS CURE 136

That weak muscles can be built up by massaging the body under water has been demonstrated in the treatment of arthritis. The process is equivalent to reducing a man to babyhood's weight so that the wasted muscles and ligaments can begin their comeback on a par with childhood's freedom. A trolley slides the patient into the water at a ninety-degree angle. The nurse also enters the water. If it is a leg that has become all but atrophied, the patient is stood upright in the water, up to his neck. In the water, he sometimes takes whole strides with muscles so weak that on land he could not move an inch. (

takes whole strides with muscles so weak
 that on land he could not move an inch.
 demonstrated by Dr. C. L.
 Longman U.S. Southern Calif
 Los Angeles, Calif.

417 E 15th St
Los Angeles, Calif

B 669 on the Cambridge - Ipswich
London & North Eastern Railway

256

POPULAR MECHANICS

England between Hulborne and Automatic Track Layer Removes Old Sections

See inside Bottom Cambridge.



Sixty-foot sections of railway track are laid at a time by an automatic rail layer that removes the old section and puts the new length in place as a continuous operation. Each new section is laid complete with sleepers or cross-ties. A machine draws the new sections together and workmen bolt them. The number of men in the track-laying crew is only half that necessary with old methods. The machine was found successful in replacing old rails on an English railway.



Wide World

Above, Workmen Bolting Sections of Track Together;
Right, Track Layer Deposits Another Section

© Express Photos, Ltd.

LIGHT TESTS PLANTS IN TUBES FOR SECRETS OF LIFE

B 937

With mechanical precision, plants turn their leaves so that the largest possible area is exposed to sunlight. Experiments have been undertaken at the Smithsonian Institution in an effort to explain the strange behavior of plants. For instance, the compass plant, which belongs to the aster family, turns its leaves in a general north and south direction. One curious little moss that grows in caves is equipped with a plate of cells forming a battery of lenses capable of focusing the scattered light on those parts concerned in carbohydrate formation. It is the phe-

nomenon of photosynthesis, which is the manufacture of carbohydrates out of carbon dioxide and water in the presence of light, that causes plants to react to the sun's rays. A specially devised apparatus has been constructed to study the way plants absorb carbon dioxide under different lighting conditions. It has been found that the intensity of light and its wavelength play important roles. The experimental plants have their roots in a nutrient solution and their tops extending into double-walled glass tubes. Lamps of known intensity and wavelength are turned on the plants, while air containing different amounts of carbon dioxide is passed through the tubes.

release 5/11/92

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ny Herald Tribune 6/3/32

Kendrick
Kendall in
Detroit news

B 785

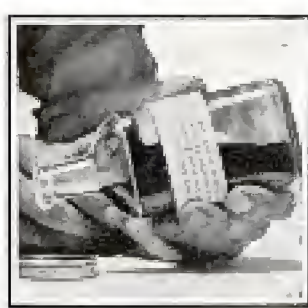
CATS AND CARS KILL AS MUCH GAME AS HUNTERS

Automobiles and house cats take as great a toll of wild life as hunters. In thickly settled districts of southern Michigan, cats range over fully half of the game cover in their nightly hunting around the farm houses. The cat is the worst destroyer of young rabbits, quail and pheasants. On the other hand, the automobile plays no favorites, killing skunks, rats, cats, pheasants, owls, and other birds and small animals, after blinding them with its headlights.

pg 20

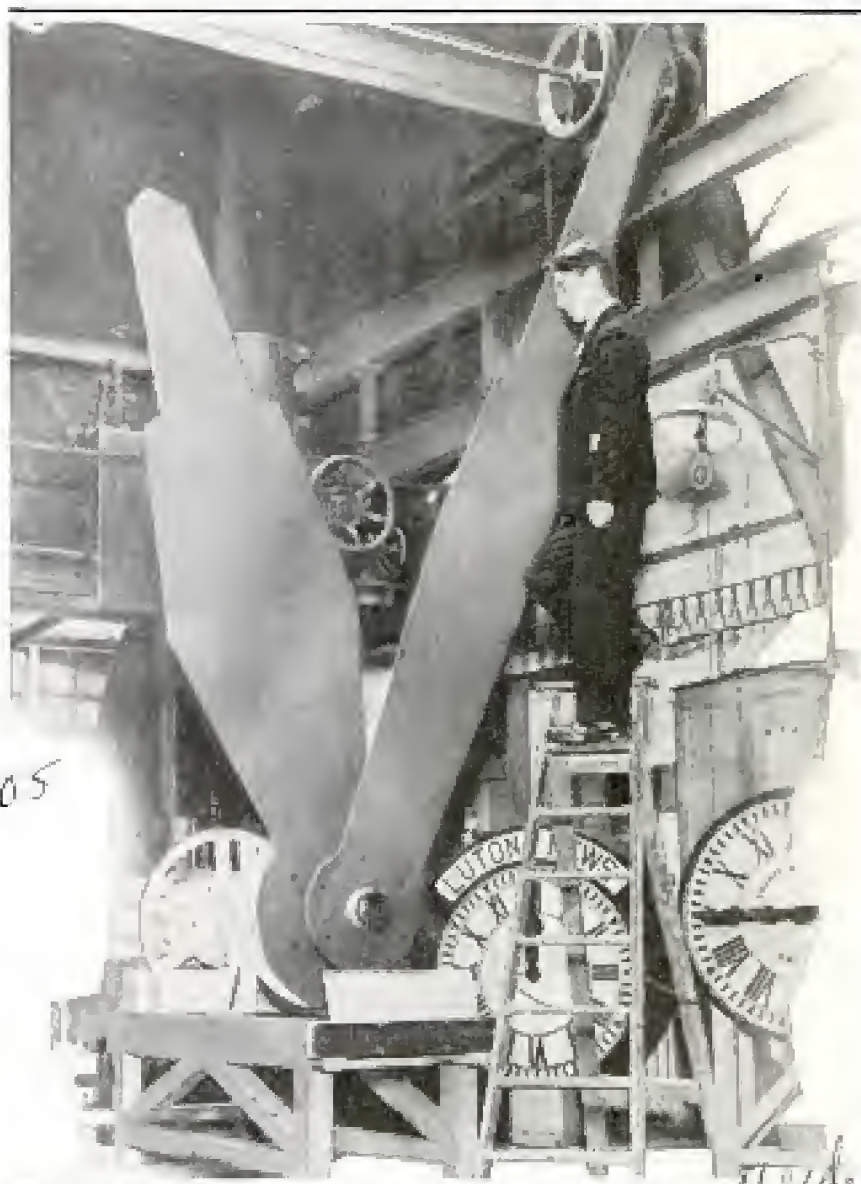
MEDICINE BOTTLE MEASURES DOSE

Containing two compartments separated by a metal and composition wall, a self-measuring medicine bottle delivers the exact amount of liquid specified by the doctor. The partition has two small holes connecting the larger, or storage, chamber with the measuring reservoir. The bottle is filled through an opening in the edge which is closed by a cork when not in use. To pour the medicine, the container is tilted until the liquid runs from the storage compartment into the smaller one. It flows when the cork is removed



from the storage chamber, and stops when the thumb is placed over the opening, thus sealing the chamber from outside air pressure. With the thumb still in place, the bottle is turned bottom up to empty the measuring chamber.

Chas. Herbert F. Lynch
Mayndridge, Kan



Comparing the Size of the Minute Hand with That of a Man Gives You an Idea of How Large Will Be London's Biggest Clock

World

CLOCK LARGER THAN "BIG BEN" HAS ELEVEN-FOOT HAND

Larger than the famous "Big Ben" whose booming notes have been carried by radio to all parts of the world, a new clock has been built in London. The minute hand is eleven feet, six inches long, and the hour hand, eight feet, eight inches. The face is twenty-five feet square. A small electric clock operates the giant timepiece on the 150-foot tower of the building erected on the site of the old Hotel Cecil.

Shell. Mex Bldg

Names and addresses of manufacturers of articles described in this magazine will be furnished free by our Bureau of Information.

B667 Bayden Sparkes, 199 Puritan
Ave. Forest Hills, L.I. New York

BIG CITY



THE police were the ones who appealed for help. The yellow flame of a gas light in the shabby old lodging-house bedroom shone on something entirely outside their experience. The unshaven dead man, lying stiffly in the bed with his eyes fixed on the ceiling, was no problem.

What terrified them was the red ape which crouched on the bed.

The ape was about the size of an airedale, his fangs were wolflike and his manners those of an angry maniac. Even a shuffle of the heavy shoes of the blue-coated figures, clustered at the door, but not daring to enter, was enough to evoke screaming threats from this faithful guardian. Clearly the ape had to be restored to



Vicious Monkey That Made Its Escape and Finally Was Recaptured

the cage that stood with door open on the floor, before the body could be removed to the morgue.

Among all the seven millions of people who live in New York, there is only one man to be relied on in such a situation. His name is Ryan. "Bill" Ryan of the American Society

for the Prevention of Cruelty to Animals. Anything from elephants to monkeys is Ryan's dish, and so the policemen put in a call for him.

Ryan came, bringing a stick lasso. He made it himself. One end of a six-foot length of stout cotton line is fastened securely to the end of a heavy four-foot rod of hickory by the sheath of a brass ferrule weighing several pounds. The tip of that

Animal Trapping

By
BOYDEN SPARKES

ferrule projects at right angles to the rod about one inch. In this projection is an eye through which the free end of the rope is threaded. With the end of the rod in one hand and the end of the rope in the other and the loop at their juncture hanging loose, Ryan is prepared to face any



Rescued Cat and the Lasso Stick That Secured the Animal

animal from a rabid dog to a leopard.

Round one was not so hot. "Get in that cage!" roared Ryan and the red ape scampered off the bed and flung himself into the cage. Ryan latched the door and went down to the street to prepare his truck to receive the prisoner.

Round two was unexpected—and prolonged. As the policemen entered the room with a stretcher, the ape was reaching through the bars of the cage a forearm as thick and strong as that of a pit bulldog. Intelligent fingers were feeling for the latch on the cage. The policemen carrying the stretcher had gone from the room and were midway on the long flight of stairs when the ape passed them, us-

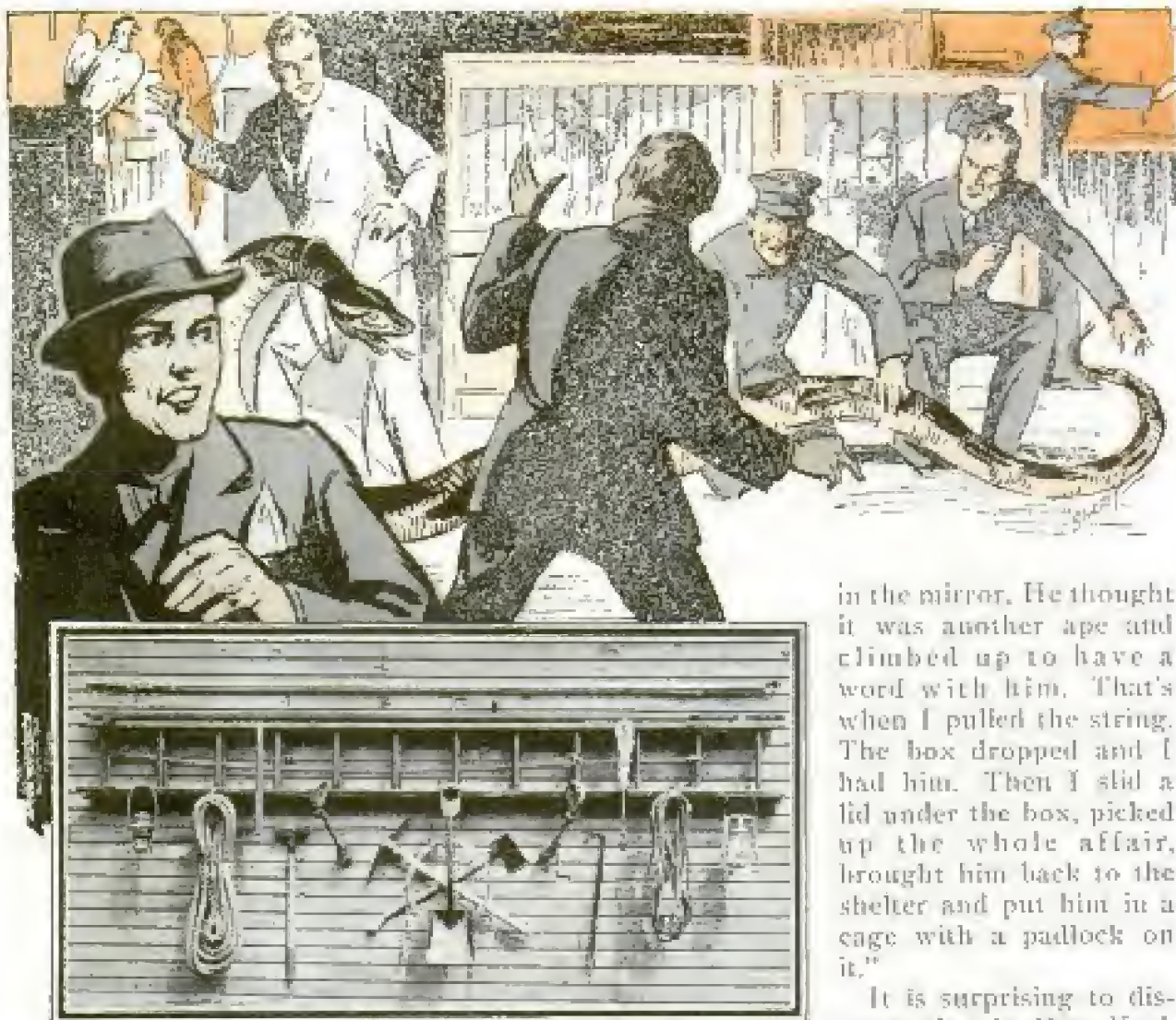


ing the banister rail as a highway. Someone had to recapture him and the someone was Ryan.

"What a time I had with that fellow," said Ryan. "He was on top of vans, the elevated structure, the walls of buildings and, once, he took to the top of a street car. I couldn't get anywhere near him. But I got a system for monkeys. In case you ever have to trap a monkey, I'll explain it to you.

"I got a packing case, one that was open on one side. I took a couple of boards out of the side and nailed screening in their place. Then I took a big mirror and fastened that to the bottom of the box. That's the whole trick. I put a long line on a stick and then turned the box over,





Some of Equipment, Including Ladders, Ropes and Lassoes, Used in Rescuing All Kinds of Animals, from Cats to Elephants

one end propped up on the stick. When I jerked the line the stick would come away and the box would drop; but it would not drop fast enough to trap a monkey. That's why I had that mirror. The substitution of screen for boards was to admit light so that the mirror could do its stuff.

"Next I got some bananas off a street peddler. That ape was hungry. He watched me peel one of the bananas. I took a bite and snapped my lips. His eyes followed every movement. Then I walked over, put the banana inside the box and strolled away holding the line. Presently he clambered down a drain pipe on the side of a building and approached the box. I never moved even when he passed under it. From past experience I knew that when he reached up for the banana, hanging at the end of a string, he saw his reflection

in the mirror. He thought it was another ape and climbed up to have a word with him. That's when I pulled the string. The box dropped and I had him. Then I slid a lid under the box, picked up the whole affair, brought him back to the shelter and put him in a cage with a padlock on it."

It is surprising to discover that in New York City approximately 1,000 stray or unwanted animals must be gathered up every week day, but this fact is proportionately true of every city in the country. Most are cats. In one year as many as 260,000 cats were handled at the A. S. P. C. A., and most of them had to be caught and painlessly destroyed. If you had to capture one of them, you might better realize that a cat, after all, is just a small tiger. The total of dogs handled last year was 75,539, and the total of all other species of animals was 370, an average of more than one for every day of the year. These may include anything, because in such a place as New York there are more wild animals than you might expect to find by beating over a similar area of jungle.

There are three zoological parks in New York; several wholesale dealers in wild animals; usually one or more circus menageries; numerous wild animal "acts,"

and an astounding number of exotic pets. Long ago Ryan was graduated from mere dog and cat catching. Nowadays he tackles most of the rescue work involving horses and other animals.

The time the lion got away, Ryan was totally unprepared. It happened at the shelter, most of which is an animal hospital. In command there is the chief veterinary surgeon, Dr. Raymon V. Garbutt. For days the horses had been restless and excitable because of the presence in the building of the family of lions. Each time they roared, the horses trembled and pranced in their stalls. Gradually the strong odor of lion subdued all other odors in the building. Consequently, more than the usual anxiety afflicted the frightened dogs unloaded in the pens each afternoon by the dog-catching crews of the raid wagons. The lions were the property of a stranded South American woman lion trainer. It had been Ryan's job to bring

tempted to transfer one of the brutes to an extra cage. There was a flash of tawny hide and the male lion was loose in the room. A yell from the kennel man brought Ryan on the run. There was a forty-five six-shooter in Ryan's pocket and by luck he was



Bandaging the Leg of a Horse at an Animal Shelter after Animal Was Injured in a Fall

them to the shelter one day when an expressman, angered because he was unpaid for hauling them from a theater, dumped their cages on the sidewalk of a mid-town street. Unable to get a vaudeville engagement, the woman was glad to see the society take charge of her beasts.

So it happened one night that a kennel man, preparing to clean the lions' cages at-



carrying a heavy iron bar fitted at the end with a saw-toothed blade. The kennel



man had his hand on the knob of one door as Ryan entered the other.

"Stand by," yelled Ryan. "You're gonna stay here with me till we get him back in his cage. You go out that door and I'll start shooting—and I might miss the lion and hit you."

The lion, facing him with fangs bared, struck viciously with one forepaw. The building shook as its claws rattled against the floor; so did the kennel man's knees. The lion sensed the deadliness of the pistol in

Ryan's right hand; it knew the pain that could be inflicted by an iron bar.

"You," said Ryan to the kennel man, "get on top of that cage and pull up the door." The door, made of bars, slid up and down in grooves in the manner of a window. "Now then, what are those words that woman uses to make 'em jump from cage to cage?" Neither of them could recall the words.

"All right," said Ryan, "I'll make him go in but don't you drop that door!"

Circling cautiously toward the lion's flank and trying not to be



Cats Get Caught in Almost Inaccessible Places. Then Start Calling for Help: Here Is One Being Taken from a Drain Pipe

made nervous by the angry thrashing of the female lions, Ryan took up a fresh position. If the lion retreated now, it

(Continued to page 114A)

CRUDE-OIL POWER IS TRIPLED IN TEN YEARS

Automotive power obtained from a gallon of crude oil has been tripled in ten years. Increased efficiency of the automobile engine, production of more gallons of gasoline out of a barrel of crude oil and advancement in the production of anti-knock gasolines have brought about this 300-per-cent increase, R. T. Haslam reports to the American Chemical society. The power of the average auto engine has been doubled with only a six-per-cent increase in engine displacement and a twenty-five-per-cent increase in average speed. High-compression engines have been made practical by the production of anti-knock fuel, either by cracking processes or by adding tetra-ethyl lead to gasoline. The refineries have made more gasoline out of less oil by cracking heavy oils into light ones, reducing losses by making less gas, coke and tar, and using less fuel in making gasoline. In the last ten years, the amount of crude oil refined within the United States per car registered has declined from about fifty-two and one-half to about thirty-five barrels per year. This increased efficiency of crude oil has resulted in over-production, so that a nine months' supply of petroleum products is now on hand—over 600,000,000 forty-two-gallon barrels.

COWS TRAVEL FIRST CLASS

Cows are the first-class passengers on a steamship "Slieve More" between England and Ireland. Forced ventilation reaches every part of the boat, and electric fans keep the animals cool. Special partitions insure each cow against being bumped by her neighbor.

Cont. J. E. Barries, 50 Herald
and 12 Avenue Chicago



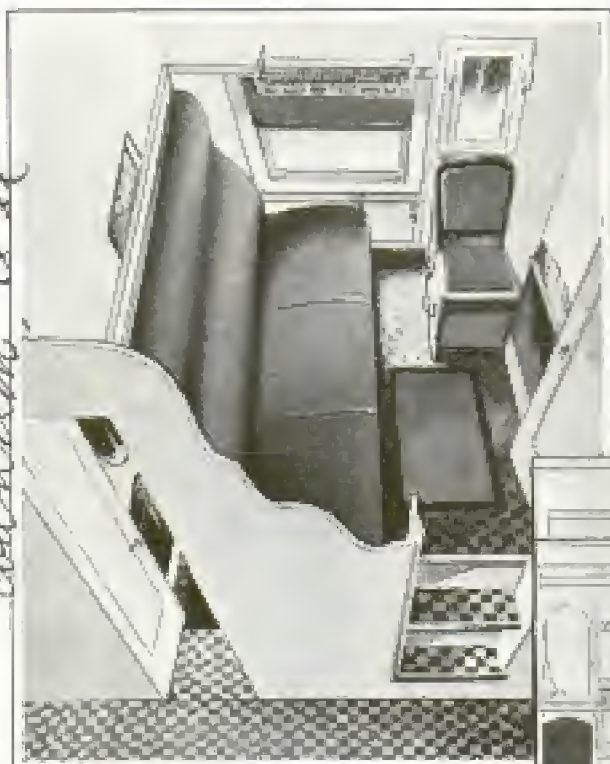
Barrier for Sprinters to Insure an Even Get-Away and Prevent Beating the Gun; the Starter's Pistol Controls the Lifting Apparatus

STARTING GATE FOR SPRINTERS ASSURES EVEN GET-AWAY

Sprinters now can be started down the cinder track by means of a barrier resembling the starting gate used on race tracks to assure an even get-away for the horses. The runners line up in position behind the gate, which consists of strips of canvas, the vertical sections outlining the position for each contestant. The barrier-control apparatus is connected by a cord to the starting pistol so that when this is fired, the gate flies up automatically. This prevents any runner from beating the gun.

¶The Popular Mechanics' Bureau of Information offers its free service to all readers of our magazine. Names and addresses of manufacturers and dealers in articles described will be promptly furnished by addressing the bureau.

Enl. A. S. Chapman, 207 Main St.
Canton, Mass.



Upper Story of Pullman, Showing Steps and Seat Arrangement, and Cross Section of Both "Floors"

TWO-STORY PULLMAN ROOMS GIVE ADDED COMFORT

Complete privacy and many conveniences are offered in sleeping cars each equipped with four rooms, two above and two below, in a duplex arrangement. Each room has a window, one long seat for comfortable day travel and for converting into a bed, a washbowl and toilet concealed by a small seat and storage space for baggage. A short stairway leads to the second-story room. The rooms are nested so the occupants can stand comfortably, while the seats or berths are placed one above the other, with the ceiling between. This arrangement is necessary to avoid raising the height of the car roof too much. If the duplex Pullman meets with favor, the company plans to build others for regular service.

islands, an iron-bearing archipelago which is shown on maps as much as thirty miles away from the true location. Hitherto these errors have had little practical significance, but with the development of the section and the opening of navigation to Europe, more accurate location of shore-lines has become of great importance.

GLASS MODELS OF OCEAN LIFE FASHIONED BY BLOWING

B 766



Glass models of under-sea animal life are delicately wrought by craftsmen who learned their art in a Black Forest village of Germany. Glass blowing has been practiced there for several hundred years and the fashioning of microscopic marine life has been brought to America by Hermann O. Mueller, of the American Museum of

Natural History. Radiolaria, tiny creatures that float near the surface in warm seas and construct for themselves radiating skeletons of opal-like glass, are reproduced by the glass blower. Silicon in the sea water supplies material for the glass skeletons. Delicate patterns are fashioned by the tiny creatures.

New York City



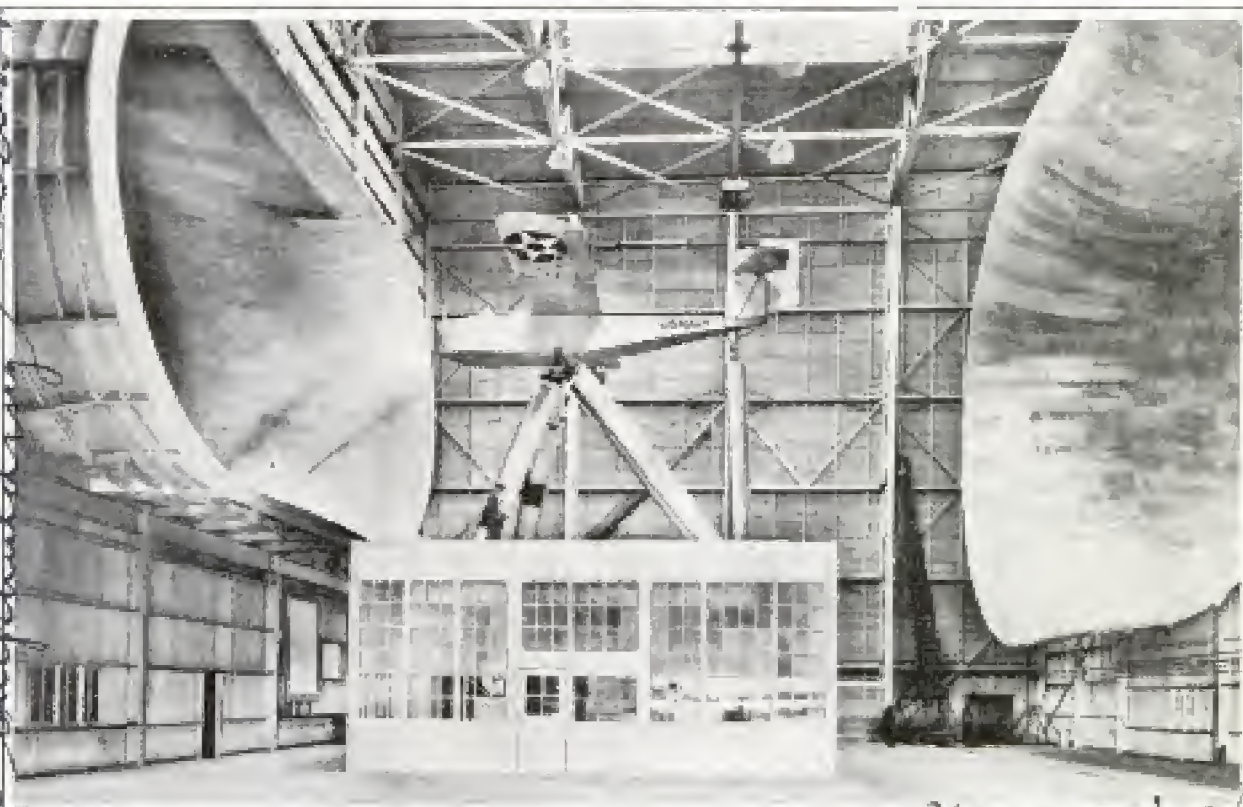
Deep-Sea Plants and Animals Are Models for Glass Blower; Note Delicate Lifelike Designs

B 895 SHORE OF HUDSON BAY SHOWN MILES WRONG ON MAPS

On existing maps, the eastern shore of Hudson bay is shown as much as twenty-five miles out of place, according to Dr. Noel J. Ogilvie, director of the geodetic survey of Canada. He made this discovery in the course of a survey of the Belcher

Ottawa, Canada

Hundred-Mile Gale in Tunnel Tests Planes



Flowing from the Large Cone on the Left, a Man-Made Hurricane Rips at Every Part of the Airplane Shown in the Center and Then Passes Out through the Big Cone at Right

Full-size airplanes are subjected to the force of a 112-mile-an-hour hurricane that blows through a man-made tunnel at one of the United States navy bases. Aerodynamic characteristics of new ships are investigated by mounting the planes on a balance, then turning on the hurricane. The air stream is sixty feet wide and thirty feet high, flowing from a huge cone over the plane and out through another cone.

batteries now used for driving submerged submarines, while danger of battery fumes in disabled craft would be eliminated.

WHEEL "ARMS" HELP TRACTOR OVER SOFT GROUND

Steel blades or arms extending from the outside of the wheels have been found practical for helping tractors over soft ground. The blades, which are curved and attached in a circle, are hinged to the rims of the tractor wheels.



and prevents them from sinking into the soft ground.

GAS ENGINES RUN UNDER WATER ON THEIR OWN EXHAUSTS

By adding oxygen to exhaust gas, the approximate composition of air can be maintained at the intake of submarine engines so that they may be used to drive the craft while submerged. In addition, no bubbles rise to the surface to betray the submarine's position. The engine, with the addition of oxygen, is practically a closed circuit, using its own exhaust gas time after time. This method solves the problem of obtaining sufficient air for combustion in the engine. Weight would be reduced by removing electric storage

Described in Popular Science, page 41.

U.S. World

13. rue d'Angliem Paris, France

Latil tractor

of some scientific school, and of Pennsylvania Phil. Chester Pa. working with U.S. Navy and Sun Shipbuilding Co.

Developed by Francis Masie and Vincent Chevorelli.

B3848 J.W.C. J
Jacobsen, 16
266
Sherman St
San Francisco, Calif

Attachable to Boat or
Tree, This Fishing-Rod
Holder Is a Help to the
Angler



HOLDER FOR YOUR FISHING ROD SITS AT ANY ANGLE

Your fishing pole or rod will be held at any angle if it is set into a metal holder just introduced. The device can be attached to boats, trees or simply placed on the bank or shore.

B. 89 STUDY EARTHQUAKE WAVES

Through a study of earthquake waves, such questions as where the roots of the mountains are, and how deep the crust of the earth is, may be answered. This is the hope of Dr. W. T. Thom, of Princeton University, who points to the effective use of artificial earthquakes in locating oil. The deeper structures can hardly be reached by such made-to-order earthquakes, but there are plenty of natural ones happening all the time, and the writings which these register on seismographic instruments can be interpreted to yield highly significant facts, especially regard-

Princeton, N.J.

Capt. Charles R. Whitehead
c/o Holtz. Catal Electric Co
125 Amory St
Boston, Mass

ing conditions of the earth's crust along known lines of activity and particularly beneath the oceans.

B. 923

LAKE BUILT ON MOUNTAIN TOP TO RUN ELECTRIC PLANT

Surrounded by the beauties of the Swiss Alps, an artificial lake is being constructed at a 7,000-foot altitude to provide power for a hydroelectric plant. This lake, high in the mountains, will be created by a dam, 1,500 feet long, 300 feet high and 250 feet thick, which is being built near Sion in the Rhone valley. The plant will generate 200,000 horsepower.

Switzerland

PERISCOPE MOUNTED ON TRUCK GIVES DRIVER REAR VIEW

B. 825

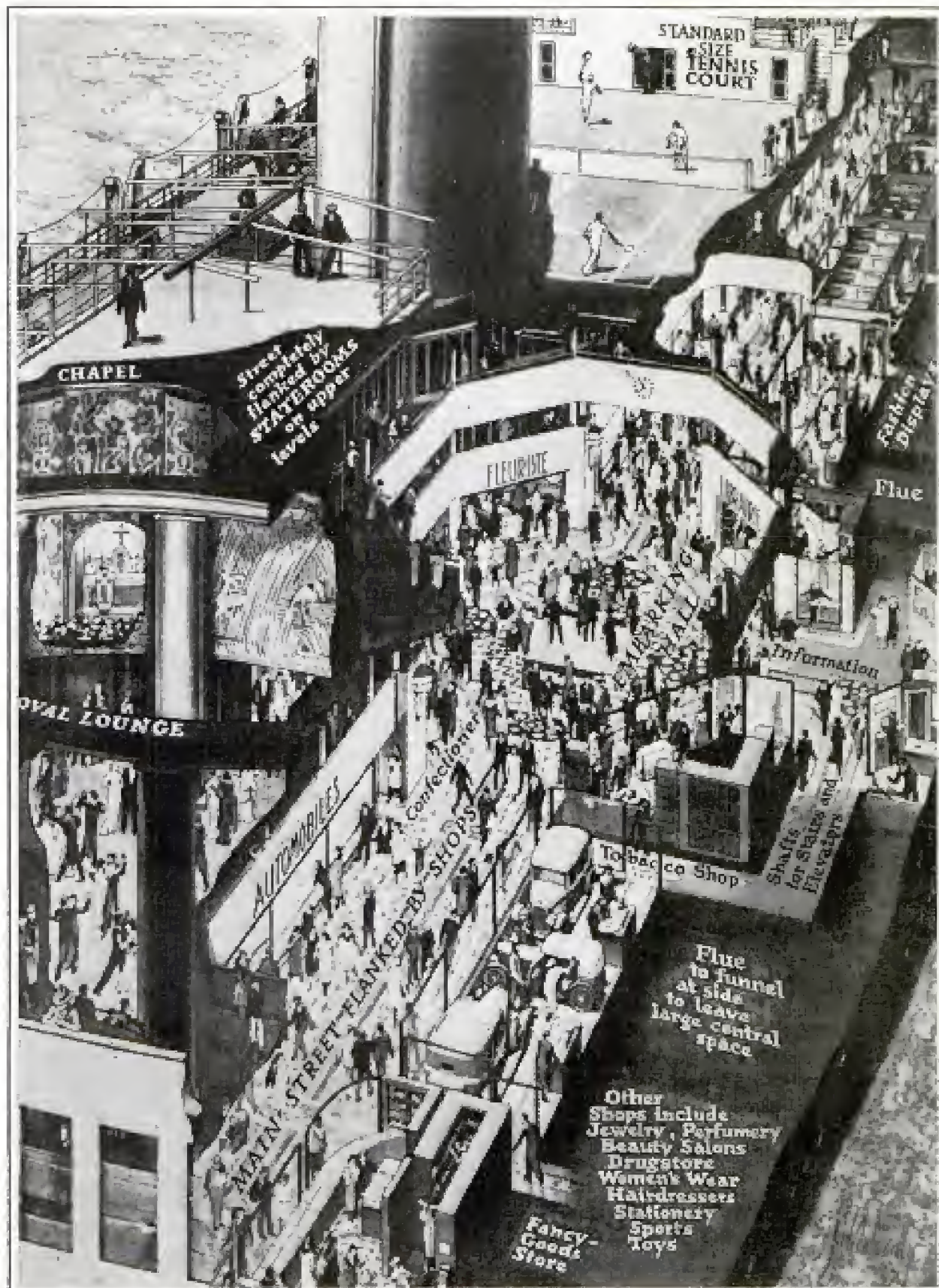
Periscopes for trucks, busses and delivery cars now give the drivers a clear view of the road behind without the use of rear-view mirrors set in the cab or on the fenders. One type of periscope has an elevator which can be raised according to the height of the load. The principle is similar to the same device as used on submarines. There is a tubular pipe with L-shaped ends. In the upper elbow a lens focuses an inverted view of the road on a mirror which flashes the view to another mirror in the lower elbow where it appears right side up. The device gives a complete picture of the road behind, and eliminates the "blind" spots encountered in using most rear-view mirrors.



Truck Equipped with a Periscope Which Can Be Elevated to Permit Driver to Obtain Rear View

Ans. C. S. Mork,
Nebraska City, Neb.
will be on market

Liner Built Like City Has Own Main Street



Copyright, Popular Mechanics Magazine

Internal Arrangement of French Liner "L'Atlantique," Which Has Its Own Main Street Lined with Shops, a Full-Size Tennis Court and a Large Chapel

Clatworthy
Copyrighted material

00450

Washington, D.C.



Top, Machine Digging a Trench for Cable; Bottom, Covering the Trench After Phone Line Has Been Laid

TELEPHONE-CABLE LAYER DIGS AND FILLS OWN TRENCH

Pulled by three heavy-duty endless-tread tractors, a cable layer has been developed by the Bell Telephone organization that digs its own trench, places the cable in it and closes it up, all in one operation. The trench is twenty-seven inches deep, and the plow is fitted for a spool of cable with a capacity of 1,000 feet. All hand labor, formerly necessary for the digging and filling of the trench, has been eliminated, and the lines may be placed almost anywhere, as the tractors are capable of operation in practically any ground.

RHEUMATISM BLAMED ON LACK OF SULPHUR IN BODY

Arthritis, or rheumatism, may be caused by the fact that the sulphur balance of the body has been disturbed. This is the opinion of Dr. M. N. Sullivan, of Georgetown University, who has examined tiny bits of fingernails of arthritics and non-sufferers. In the former, he found much less cystine, which is the chief sulphur-containing building block of the body. This discovery is being followed up by treating sufferers with injections of sulphur.

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B2 605

AUTO IS PARKED BY CONTROL-BOX PIN

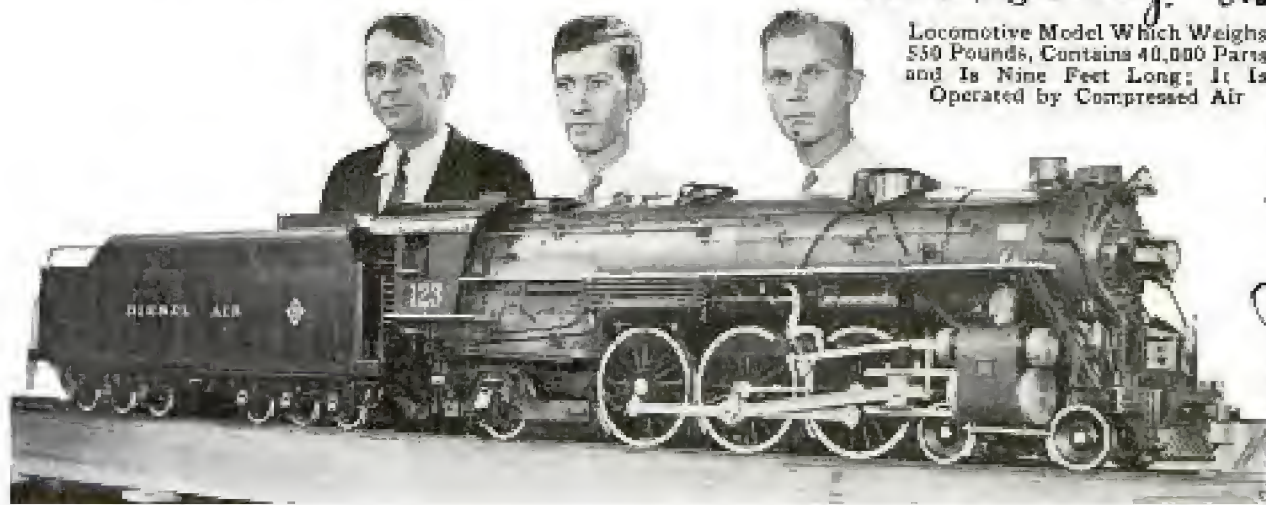
Parking your auto is as simple as sticking a pin into a hole. That is exactly how a new parking machine is operated. Each hole in the control box is numbered to correspond to one of the cages in the machine. When the pin is poked into a hole, the corresponding cage is automatically brought to the driveway level, ready for use. The simple operation is demonstrated

by a model built by the Westinghouse Electric and Manufacturing company.



Model Shows New Method of City Auto Parking

B90 3 Designed by A. R. Herff
 109. Overland Mr. Germaine P. Herff
 POPULAR MECHANICS 269
 Her, Bldg. owner



Locomotive Model Which Weighs
 550 Pounds, Contains 40,000 Parts
 and Is Nine Feet Long; It Is
 Operated by Compressed Air

Designed by - W. R. Helgeson
 615 S. Cherry St. San Antonio
 Charles R. Helgeson

QUARTER-TON LOCOMOTIVE RUN BY COMPRESSED AIR

Three men in San Antonio, Tex., after three years of work, have just completed a 550-pound locomotive model which cost \$13,000 and is operated by compressed air instead of steam. With its tender, the engine is nine feet long and contains more than 40,000 parts. The designers claim the power principle of compressed air supplied by motors is also adaptable to full-size engines. They are now building box cars and other equipment to complete a train which the locomotive will haul.

LIGHT-WAVE MEASURE TESTED AS YARD AND POUND SHRINK

Shrinkage of the British standards for the yard and pound has brought a demand for measures that will not decrease in weight or length. An accuracy of four-millionths of an inch has been found in the "light-wave yardstick," so tests will be made to determine the exact speed at which a light beam would have to travel to produce a pressure of one pound. If scientists are able to carry out this experiment, the light wave is expected to be used for measuring weight as well as length. From 1852 to 1932, the imperial yardstick, which is a bar of gun metal imbedded in a wall of the House of Commons, shrank two ten-thousandths of an inch. At the same time, the imperial pound, a cylinder of platinum, decreased by five-millionths of its own weight. While the housewife will know no difference in her purchases at the market, the yard and pound must

remain constant for the close measurements demanded in scientific studies. Accuracy to one ten-thousandth of an inch is necessary in constructing some ball bearings.

PUPILS MAKE THEIR OWN MAPS WITH RUBBER MOLDS

Designed as an aid to education, rubber molds from which school children can produce their own relief maps, are available. The molds, constructed in boxes, have the maps cut in reverse. When the box is packed with plaster of paris or some other plastic material, the lid is closed tightly and the material allowed to harden for ten or fifteen minutes. Then the finished map is lifted from the box. Crayons, pencils or paints can be used to show the distribution of farm products, to

Mold. A. Map \$1.00



Packed with Plastic Material, These Molds Produce
 Relief Maps for the Classroom

indicate historical movements or to designate mountain ranges, railroads, cities, and the like. The molds may be used many times.

N.Y. Herald Tribune

5/8/32

Educational Molds Co
 1401 S. Los Angeles
 Los Angeles, Caly

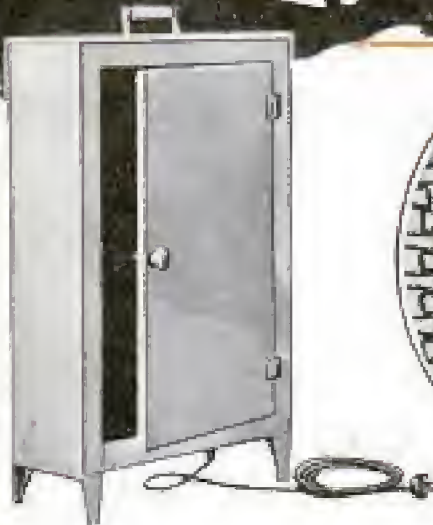
EASIER WAYS



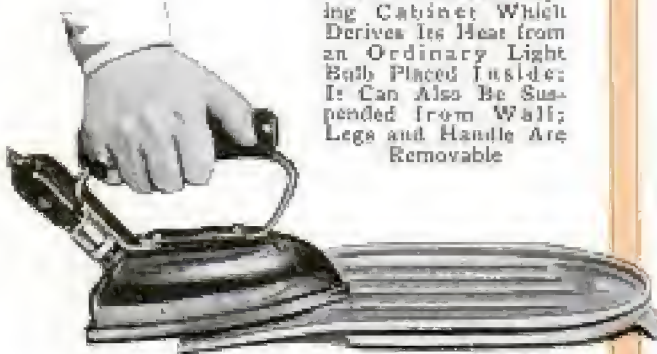
Left, Portable Jumping Seat for Baby, Suspended by Springs Attached to Frame; It Is Collapsible



Bottle Cap, Above, Has Opener and Corkscrew, Fits Any-Size Bottle and Can Be Used as a Funnel or Measuring Cup; Left, File Rug with Rubber Back Prevents Slipping



Above, Portable Drying Cabinet Which Derives Its Heat from an Ordinary Light Bulb Placed Inside; It Can Also Be Suspended from Wall; Legs and Handle Are Removable



Above, Flatiron Holder with Double Air Space to Prevent Overheating; Right, Cotton Container Made in Colors to Match the Bathroom Fixtures



of DOING IT



Above, Gas Broiler Which Applies Heat to Both Sides of Food Simultaneously; the Grid Automatically Adjusts Itself to Thickness of Meat; Plates Are Warmed Underneath While Meat Cooks



Above, Gas Range with Individual Compartments, Which Is Easily Changed to Right or Left-Hand Oven, as Kitchen Space Requires



Left, Portable Water Softener That Can Be Attached, by Means of a Rubber Hose, to Any Outlet in the Home

Right, Hand Vacuum Cleaner Which, When Reversed, Becomes a Moth Exterminator, Spraying a Powder That Destroys Moth Larvae; It Is Electrically Operated



Left, Transparent Sleeve Protectors Which Are Adjustable by Means of Rubber Bands; the Cuffs Are Washable, and a Wrist Watch Can Be Seen through Them; They Are Handy for the Scenographer or Housewife and Workers Generally

B. 855

Science Service
4/26/32

ACROBATS ON SPEEDING BICYCLE DISPLAY BALANCING ART

Three members of an international-acrobatic team have perfected a balancing act on a speeding

The Boslows

Exhibition at Reuil Stadium
near Paris, France



One Slip—But These Acrobats Know Something Serious Would Happen, So They Balance Perfectly at This Point in Their Exhibition

motor bicycle. One little slip or sidesway at the wrong moment would send the troupe tumbling from their perch. The acrobats balance as the bicycle makes sharp turns at high speed.

COSMIC RAY OF BILLION VOLTS SMASHES EARTHLY ATOM

Cosmic rays representing energy of one billion volts have been detected at the California Institute of Technology. There are no energies from processes taking place on earth that are more than 8,000,000 volts and no higher measurements had heretofore been made until experiments with cosmic rays were performed by Dr. Carl

D. Anderson under the direction of Dr. Robert A. Millikan, Nobel prize physicist. Such energy is 400 times that of the most intense gamma rays from radium and 4,000 times that of the most penetrating X-rays used in cancer treatment. The apparent energies of some of these rays, caught photographically in a giant ray-track chamber, have led Doctor Millikan to add two possible hypotheses to his previous suggestions as to their origin. One of these is that the energy may be derived from the entire annihilation of a proton, the positive unit of matter, in the outer parts of the universe. Equally well, they may be signals of the synthesis of heavy elements out of hydrogen in distant spaces. If the latter idea should be correct, it means that silver, gold and other heavy elements are much more plentiful in the rest of the universe than on earth, for a thousand million volts is about the energy that would be given off if silver were synthesized out of hydrogen. By building a large "cloud chamber" in which cosmic rays rushing through moisture-charged air or gas leave a visible track of tiny water droplets, and by subjecting the chamber to an immense magnetic field that bends the rays, evidence was obtained that they are probably of the same nature as light and X-rays, rather than neutron particles, a theory advanced in Europe.

Popular Mechanics Magazine does not publish the name of the maker or seller of any device described in its pages, but this information is kept on file and will be furnished free upon application to our Bureau of Information.

Paradise
Calif

Mr. Carl D. Anderson

Bakery on Wheels Pulled by Rolling "Cake"

Bakery on Wheels with Truck Trailer Built to Resemble Huge Cake; the "Cake" Has a Loud Speaker and Supplies Electric Power to Light Bakery Display

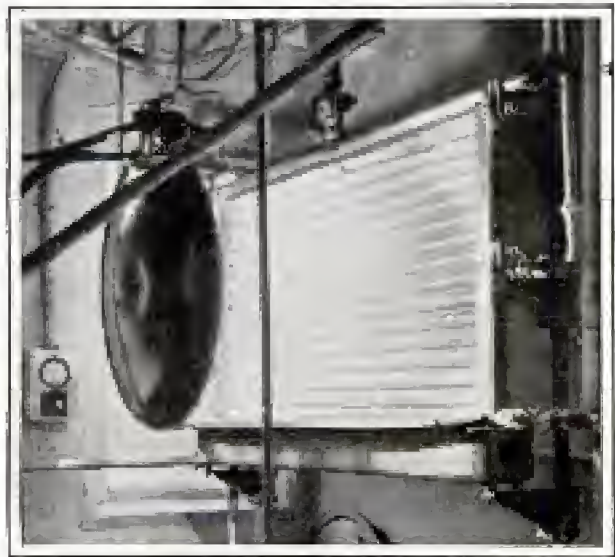


Built in the form of a huge cake, a truck trailer, attached to a bakery on wheels, recently attracted much attention in Berlin. The trailer not only serves to advertise the traveling shop, but also furnishes the electric power to light the shop's display of wares and has a loud speaker.

SUN'S VITAMINS PUT INTO MILK BY ELECTRIC RAYS

Electric rays from the carbon arc are turned on a cascade of milk pouring over tubular cooling coils in two experimental plants in the United States as a practical method of injecting sunshine vitamins in-

to the milk is sought. The tests were begun at the University of Wisconsin and at a Philadelphia dairy plant in the hope that some way might be found for treating city milk supplies. Irradiated milk yields as high a sunshine vitamin content per quart as three teaspoonfuls of cod-liver oil. That it is possible to inject these vitamins into the milk has been demonstrated in the tests, but a system of controlling the operation so that the flavor will not be changed is necessary. In Wisconsin, the milk is exposed to ultraviolet light from flaming-type carbon arcs during the period it takes for the fluid to flow down over the coils placed a few feet from the arcs. If milk is put through the process two or three times, the overexposure results in a distinct change in flavor. To regulate the rate of flow and the power and distance of the light rays so as to determine the proper degree of irradiation is being worked out.



Milk Pouring over Frame Is Subjected to Powerful Rays of Ultraviolet Lamp

Cont. E. Q. McIntyre.
221 Washington Bldg
Madison, Wis.

BEES FOR RENT

Colonies of bees are rented by New York fruit growers to help pollenize trees. Instead of maintaining their own hives, the growers find it practical to hire bees that are sent from the south in two, three or five-pound packages. After the bees have performed their ten-day job, they are mailed back to their owners.

Cont. Jacob Heschlin
1518 Jessup Ave
Bronx, N.Y.

Cont. H. K. Kretschmer
Schwanenbergerstrasse
Berlin
Germany

Supplies. Will. Jones Slavery Co

Madison Wis

03/002

SECRETS

of the Master Spies

Hidden Messages

By THOMAS M. JOHNSON

THE train began to slow down for Pontarlier, last stop on the French side of the Swiss border. The inconspicuous-looking passenger in the dining car paid his check, and produced an old-fashioned gold toothpick, which he plied vigorously. Then he arose, and left the train.

At the first stop on the Swiss side, another traveler mounted the steps of the dining car. He sat down at the same table the first had occupied, ordered food, and produced from his bag a bottle of a well-known wine. But as he poured, the train lurched. The wine was spilled upon the tablecloth. In embarrassment, the passenger looked around, then clapped his napkin over the stain, which evidently he tried to mop up. Then he finished eating, and left the dining car.

His spilled "wine" had developed for an instant what his confederate's "toothpick" had written upon the tablecloth in invisible ink. In a few hours that report, fresh from France, had crossed Switzerland and reached Berlin. The German secret service had performed successfully the most difficult trick of their whole tricky trade: They had transmitted quickly and safely, a spy's report from the enemy's country. Thus, from time immemorial, spies have striven ingeniously to devise means of communication that they hoped to conceal from spy hunters equally ingenious.

In the World War, loyal Belgian locomotive engineers reported the doings of the German invaders by signaling across the border to British agents in Holland by opening and closing their firebox doors



in the dots and dashes of the Morse code.

In our own revolution, the American spy Nathan Hale, and the British spy Major Andre alike, hid incriminating papers in their boots, and nearly 150 years later a German woman spy was caught trying to cross the Mexican border with a code message hidden in a shoe heel. The famous Confederate woman spy, Belle Boyd, showed more originality when she carried her messages in a watch. But we must return to Europe, for really wily tricks of women spies.

Leonie Van Houtte, whom France decorated with the Legion of Honor, smuggled messengers across the frontier from Belgium to Holland not once, but twenty times, hidden in wagon loads of straw. Always two wagon loads approached the



German frontier posts simultaneously. From the first, the driver descended to have his pass examined, while the Uhlans prodded it with lances and found it bore only straw. Meantime, the second wagon, bearing the concealed man, drove up and passed the first. The driver of this second wagon mounted the first. The driver of the first wagon, emerging with clearance papers, mounted the second and drove it and its living load across the frontier to safety.

When Leonie Van Houtte joined forces with the famous Louise de Bettignies, the two women laid out an underground railway from Lille, in France, across Belgium to Holland, where they delivered their reports to Major Cameron of the British secret service. Running that perilous

gauntlet through German cordons, they hid the thin rice-paper sheets in such places as the candle of a lantern, a ball of black yarn which at night could be thrown into the bushes and found later by a single loose strand, or in a bar of chocolate, which they could eat if stopped.

Women spies often carried hidden dispatches, reports or maps over Europe—and still do—for they are less likely than men to be searched, and can hide things in their hair, corsets, false curls, garters, stockings and even bottles of smelling salts—if women still carry them. They have used hiding places so diverse as bouquets of flowers, and a baby's clothes.

Men were, and are, spy messengers too, especially on the carefully guarded routes that converge in Switzerland, that cross-

road of the secret war. The agile border-jumpers had signs and passwords: "Is the 3:45 train on time?" or "Where is number 15 on this street?" For recognition, they creased their hats in the same manner, or wore like neckties. They carried their reports sometimes in a small aluminum tube, hidden up a nostril, or concealed inside a lead pencil or a cane, in the sweatband of a hat, even in a shoestring or in the paper around a sandwich. An early trick was to jot down a few keywords on a time-table or newspaper, rolled and carried casually. A variation of the writing toothpick was for a spy on one side of the frontier to slip a message into the padded arm of a car seat, whence a confederate on the other side could extract it. A trunk with a double bottom filled with harmless material, would distract attention from a real hiding place elsewhere, perhaps between safety-razor blades or the uncut pages of a book.

The ingenuity of spies was unending. They hid messages in hollow and false teeth, in wigs, toothbrush handles, candy; in the plaster casing of a broken arm, in cotton wound dressings, in coat collars, even in common string. An experienced spy hunter would always hasten to take away



A Pilot, Bearing a Spy and Carrier Pigeons, Fell behind Enemy Lines, and Called on a Friendly Peasant to Release the Birds

the pipe of a captured suspected messenger. Above all, he would not let the suspect light the pipe. Often the message was hidden amid the tobacco!

A New Yorker who was in World War secret service shows his friends an interesting memento: An old-fashioned door key, whose barrel contains a hidden chamber opened by unscrewing a small screw. The outfit includes a combination screwdriver and appliance to stuff a roll of tissue paper into the chamber. Perhaps the cleverest of all tricks to hide these rolls of tissue paper, was discovered by a French spy chaser at Pontarlier, who thus evened up for the German writing toothpick. This inquisitive Gaul thrust his nose into a baggage car for Switzerland, and imme-



A Dentifrice Container That Was Used to Conceal Invisible Ink



A Cake of Soap Which Has Been Saturated with Invisible Writing Fluid



Soft Collar on Which Was Written Invisible Message for German Secret Service



roll of tissue paper! "What a pity they waited too long—and in such warm weather, too!" the spy chaser commented, sarcastically.

In the instant stress of secret-service work, it was often necessary to communicate by means much more rapid than messengers. It has never been told, that during the World War American secret service was worried over reports that orders were being signaled to German agents in this country, through the widespread advertisements of a nationally known patent medicine of German manufacture. The Germans had done that very thing in Europe through varying arrangements of colored squares on advertisements of a well-known brand of

diately drew it out again. "What a stench!" he cried. "But, what can it be?"

He thrust his nose in again, followed it to the carcass of a dead rabbit, which, to judge from the tag, a lady in France with a French name was sending to an equally French lady in Switzerland. It looked innocent enough, but spy chasers are suspicious.

"But why send a rabbit so long dead?" ruminated this one.

He rubbed his hand over the fur, then drew back with a start. He had felt a small lump. Closer inspection revealed inconspicuous stitches in the skin, and beneath—a glass tube, containing a small

soups. All they need do was tell their spies to watch the advertisements for their orders.

Having discovered that one, allied spy chasers found they must forbid newspapers publishing ordinary want ads until they had been investigated. German spies in France were inserting in French newspapers, especially those published near frontiers and on the seacoast, advertisements containing hidden messages to confederates in near-by neutral countries. Who would sup-



Pieces of Chocolate in Which Messages Written on Rice Paper Were Hidden



Coin with Hollow Center in Which a Spy Concealed a Message



A Tin of Talcum Powder Used by One German Spy for Secret Writing



Captive Suspected of Being German Spy Undergoing Search by Allied Officers

pose that news of a coming big Italian offensive was contained in this ad in an Italian newspaper?

"Wanted: A fine furnished room, detached, modern comforts. Answer Corti."

Or that there was a spy's report in this apparent lover's message printed in the famous London Times agony column?

"Z. Your heart watches. Be very good. No more. My God, what a weariness. I cannot come tomorrow."

The spy hunters had to forbid newspapers publishing lottery numbers, chess problems, and postage-stamp data. Luckily for them, crossword puzzles had not come in. The French stopped the advertisements in their famous *Vie Parisienne* of patriotic women wishing to correspond with lonesome soldiers—some of whom proved to be patriotic German women.

Although American secret service investigated repeated rumors that a German "hidden wireless" on the French coast was divulging movements of our troop transports, there was probably only one such installation on either side, and that behind, not the allied lines, but the German.



Right © Robert M. McBride & Co.

Right, Curling Iron Containing Message Etched in the Handle by a German Woman Spy

a man who came from regions then held by the Germans. They would ask him to go back to his old home by airplane, gather information and return. At night he would set forth upon his hazardous mission, clad outwardly as a peasant, but wearing underneath his soldier's uniform, hoping that, if captured, he would not be shot as a spy. He carried a small crate, holding a half dozen carrier pigeons, and to his back was strapped a parachute. A daring man, that

Perhaps the most daring and fascinating of all the tricks in this desperate game of secret communications, was the airplane trick. This was no less than to fly spies over the German lines by night, drop them, and call for them again a few nights later. In 1916, the Germans caught nine of these air spies and one airplane; in 1917, they got seven and another plane, while in 1918, they got only four. The British had found new ways. As the airplane trick was finally perfected, it worked this way:

Allied secret service would choose, from the Belgian or French army,



B874 dmv. Jerome
Barlow,
113 E 56 St.
Chicago

POPULAR MECHANICS

volunteer, since to keep the airplane high enough to escape German sound detectors, he must jump thousands of feet in darkness, to ground largely unknown, guided only by a light flashed up the chimney of a resident spy and perhaps not even by that.

One of the many risks of the airplane trick, is shown by the experience of a British pilot, who in landing behind the German lines, crashed in the darkness, killing his spy passenger, and breaking his own leg. The basket of pigeons alone remained unhurt, and, though stunned and pain-wracked, he divined the danger. If the Germans got them, they would send those pigeons back to the British secret service, bearing false reports. In desperate hope that a Belgian peasant, not a German soldier, would hear him, the injured pilot shouted for help. Luckily, the first person to arrive, was an old Belgian woman, who got the idea and quickly released all the pigeons—one with the pilot's scrawled report of what had happened.

No account of secret communication would be complete without mentioning three methods the doughboys firmly believed the Germans were using. These were the church tower, the windmill and the washing on the line. Every intact church tower just behind our lines was under suspicion as a place whence spies would signal by the familiar "lights flashing." So seriously did our first-division doughboys believe this of the tower in Mandres, in the Toul sector, that an Irish chaplain spent a night in the tower—and was rewarded by trapping his own cook, come to catch roosting pigeons for a potpie! The story of the windmill, was that German spies in the allied frontline used it to signal in Morse dots and dashes, across No Man's Land—until one day they forgot, and turned the windmill against the wind! The story of the washing on the line was told to our 32nd division in Alsace, where there were many mountain observatories. From one of these, French observers could see, behind the German lines, the house and grounds of a loyal Frenchman that had been taken over by a German general. They had frequent washdays, displaying on the line laundry of all shapes, sizes and arrangements—which conveyed information to the French.



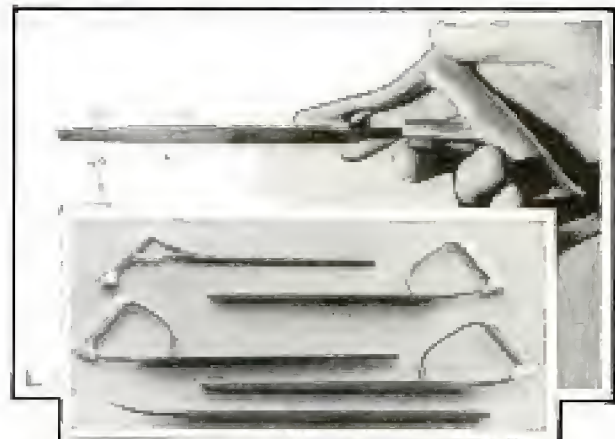
This Locked Bag
Top Has Holes for
Golf Handles, but
Head Cannot Be
Withdrawn

LOCK TOP ON GOLF BAG GUARDS CLUBS AGAINST THEFT

Theft of golf clubs can be prevented by a lock top for the golf bag. Holes in the top permit the shafts to stick through, but are not large enough for withdrawal of the club head. The top must be unlocked before any club can be removed.

PISTOL-GRIP HANDLE FOR FILES MAKES WORK EASIER

Filing is made easier by a handle that fits on the end of the file. Shaped like the grip of a pistol, it fits the hand, enabling the user to exert more pressure on the file without the usual labor and possible injury to the fingers.



Small End of File Fits into Pistol-Grip Handle to
Make Work Easier

C. Isillaspy, 704
Bankers Trust Bldg.
Copyrighted material

Chadwick, Ind.



As Criminal Flees on the Screen, Policeman Shoots at the Flickering Target; Picture Stops to Show Where Bullets Hit

POLICE FIRE AT MOVIE GUNMEN ON PICTURE-SCREEN TARGET

Gunmen fleeing from their pursuers in a moving picture cannot escape the real bullets fired by police in a new form of target practice. The movie shows burglars and gunmen in action, targets for the policemen trying to improve their marksmanship. After each shot, the picture stops, and the screen is examined to see whether the bullets hit their marks. The movie criminals are shown in various poses, including one of returning the fire of the practicing policemen.

STRANGE DOT-DASH LANGUAGE TALKED AROUND WORLD

Clicking off on the spark sets of 50,000 amateur radio operators, a strange dot-and-dash language is being heard and understood around the world. It is known as the "Q" system. Its principal drawback is the limited vocabulary. Another strange language is understood by 25,000 amateur operators in the United States. One message, sent in the international Morse code, reads: "Tks om fr el hrd u wky wid sum vk ts am ur sigs vy gud wx tdy fb fr dx nil qrn qm hr wl ob gess nm hr wl sa gm pse qsl ur crd gld 2 qso es hpe cu agn vy 73 es gl." Translated for the layman, it says: "Thanks, old man, for the call. I heard you communicating with some of the Australian amateurs this

morning. Your signals are very good. Weather today is excellent for long distance communication, no static or interference here. Well, old boy, I guess there is nothing more here so I will say good morning. Please send me your card. I am glad to have communicated with you, and I hope to do so again. Very best regards and good luck."

NEW SQUARE TO SAVE TIME FOR CARPENTERS

Eighty per cent of the time required to lay out angles for rafters, braces, frames and joints can be saved if the carpenter uses a new adjustable miter square. Scales, tables and graduations on the plate and two blades make it possible to adjust the instrument for correct angles and lock it with a setscrew to make the markings. With the standard square, five operations are necessary in laying out a hip rafter, as compared with only one setting with the new square. The instrument has a spirit level and extra blades of greater length for work on large timbers.



This Adjustable Square Saves Four-Fifths of Time Carpenter Usually Needs for Measurements

St. Louis

M. J. Stanley 5/18/32

031001

Rept. of Commerce. May 7, 1932
 2nd. Harold Abolt
 555 Washington St.
 Portland, Ore.

Movable-Wing Plane Flies and Lands Itself

Conventional ailerons are replaced by movable wings in an airplane recently demonstrated on the Pacific coast, and which has been found so stable in the air that it virtually flies itself. This free-wing ship is so designed that each wing section is pivoted to the fuselage, thus making the entire lifting surface adjustable. The inventor during a demonstration



Top, Pilot Riding Fuselage of Movable-Wing Plane; Below, Parachute Jumper Leaping with Control Stick.

climbed to the fuselage to show its ability to fly itself, then allowed a parachute jumper to carry the "stick" to the ground and came down safely without it.

ELECTRIC LIGHT BY WIRELESS ENDS MINE HAZARD

Light produced by magnetic-induction lamps has been found the safest and most efficient for coal mining. This system of illuminating relatively large areas underground is based on the principle of lighting by local induction, there being no electrical connection between the lamps and the power cables. Instead, each gas-filled lamp is permanently connected to the secondary of a small transformer, whose primary is fed from the electric lines. When

any lamp is to be used, its secondary is made active by being placed close to its primary, resulting in a magnetic coupling. When the lamp is to be extinguished, it is necessary only to remove it from the neighborhood of its primary. No switch is needed and no circuit is broken. Danger of explosions is lessened, since there is no electric spark. The system has been tested in England.

TERMINAL TOOL FOR BATTERY MAKES REMOVAL EASY

Battery terminals can be removed easily and without damage by a puller that works like pliers. The jaws of the tool grasp the terminal and only a straight upward pull is exerted, putting no strain on the post. Possibility of breaking the seal, loosening the post or disturbing the plates is eliminated.



Dr. Prof. W. C. Rans
Dept. of Electrical Engineering
Birmingham University, Eng.

The Tagit Co
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Rockford, Ill.



Wid. Work
 A Mystery to the Visitor, This Array of Dials Shows How Each Part of a Warship's Mighty Engines Is Operating

HIDDEN HEART OF MAN-OF-WAR AT ENGINE THROTTLE

Far beneath the shiny decks and grim gun turrets of the modern man-of-war, hidden from the eyes of observers, is the heart of a United States' fighting ship. Surrounded by a tomblike shell of steel, men stand at the throttle of mighty engines, constantly watching the delicate instruments that record every variation of the maze of machinery which drives big war vessels. Seldom does the navy department permit photographs to be made of these instruments, but recently the censorship was relaxed a little, and the camera brought out of the U. S. S. "Salt Lake City" a pictorial story of the progress in devising instruments and machinery.

ELECTRIC ARC ON WHEEL SAW CUTS STEEL AND ALLOYS

Steel and alloy work can be cut cleanly and speedily by a wheel saw that uses an electric arc. The cutting wheel is one electrode and the work is the other. The wheel revolves rapidly and always presents a cool surface to the work, and al-

ternating or direct current may be used. Instead of wearing away when cutting steel the wheel increases in diameter, since bits of the material attach themselves to the wheel. This makes it necessary to shave the wheel to its original size. For certain types of alloys, carbon, carborundum and copper-alloy wheels do the cutting.

B992 CARBOYS OF ACID SAFELY POURED WITH HOLDER

Acids can be poured from their bottle or barrel containers in perfect safety if a new carboy holder is used. The truck-like cradle is equipped with wheels which retract while the carboy is being loaded. The handle is swung over the carboy and locked into position for pouring, so that the operator's hands do not touch the bottle or barrel. Danger of slipping or of pouring liquids on unsteady frame or wheels is eliminated. The metal platform of the holder supports the entire bottom of the carboy. Weighing thirty-five pounds, the holder is designed for weights up to 250 pounds.

\$15.00

Liquids Are Poured Easily from Carboys by Using This Roll-Over Holder



Fidelity Products, Inc.
Chrysler Bldg.
New York

Electric Arc-Cutting & Welding
Co., 152 Jelliff Ave. Newark, N. J.

Chicago - Central States
Engineering & Construction Co.
100

U.S.S. Salt Lake City

B. 881. Cont. Lewis R. Freeman,
J. H. Wilson are
Pasadena, Calif

Coffee by Pipe Line



THROUGH a unique system by which coffee is conveyed down the steep sides of the Andes mountains in pipe lines, a Yankee from Cincinnati has conquered what appeared to be an impossible transportation problem on his huge coffee plantation near Santa Marta, Colombia. The planter, named Fly, came to Santa Marta thirty years ago to run the electric-light system there, but soon saw the possibilities of the Andes ranges as a coffee region and established the "Cincinnati" plantation.

At first, coffee was picked, berry by berry, then carried by the picker either to the mill, or to the nearest pack-mule loading point, a comparatively costly process. Worse still, it used up a great amount of labor at times when pickers were scarce.

The idea for a system that would speed up transport and cut costs came to Fly in watching the scores of streams which coursed down the mountainside. A board tossed into one of these torrents reached the lower boundary of the plantation in a few minutes, while it might take a man or pack horse two or three hours to go half that distance. Floating down the coffee in bags or barrels was impracticable on account of the violence of the cascades,



Top, Packing Coffee by Mule Train; Below, Flume Conveying Water to the Coffee Line



Top, Mill of Coffee Plantation with Pipe Line at Left;
Below, Loading Station at Head of Line

but why not deflect the water and run it in flumes, as for an irrigation or power project? The steepness of the descent made an open flume impossible, but how about a covered one? And that led to the idea of using a pipe line.

The pipe for the experimental line was of galvanized iron and of about twice the diameter and strength of the ordinary drain pipe of an eavestrough. The sections

telescoped into one another, a light knotting of wire insuring the joint against slipping. Light but strong trestles over ravines and narrow valleys were built to keep the grade uniform. Some of the trestles were fifty feet high and half a mile long. Where the topography permitted, the line was run along the ground in a shallow trench, to protect it from falling trees.

Water was provided by diversion from a convenient stream to an irrigation or power ditch intake. A shallow concrete dam and headgate deflected the necessary flow, and this was carried in a flume to the site of the loading station at the head of the pipe line. The rest proved to be largely a matter of regulating the mixture of water and berries. This was simple enough once it was learned that the principal cause of the jamming of the pipe arose from feeding in the berries too fast.

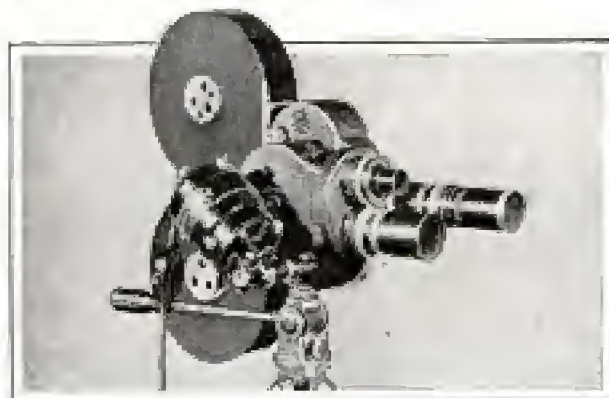
What was now needed was to put the whole plantation on a pipe-line basis. With this form of transport, obviously, the mill would have to be located at the lowest practicable point, so that water would flow to it by gravity from all sections. Such a

site proved to be two miles away from and 5,000 feet below the original plantation center. On a map, or from the air, the pipe-line system looks like a one-sided spiderweb, converging on the mill at the lower corner. Branch joins branch after branch, until all are united in the two or three main trunks which carry direct to the mill. At the outer and upper end of each branch is a loading station, to which the newly picked berries are carried in baskets.

The overloading and jams that would inevitably result from feeding too many interconnecting branches at once is obviated just as on a railway. There is a telephone dispatch system, and no loading station foreman releases a deluge of fruit until he gets an "all clear" from the chief dispatcher at the mill. The frequent telephones also make it possible to report breakages of the line, thus minimizing the sluicing off of berries.

B. 891 MOVIE CAMERA FOR AIRPLANES HAS ELECTRIC MOTOR

Run by an electric motor, a portable movie camera has been designed for airplane photography. The pilot, after attaching the camera, can take pictures by remote control, simply starting and stopping the motor for the number of desired exposures. An internal magazine carries 100 feet of film, while an external magazine for 400 feet of film is available. Speeds at which pictures are made are regulated by the motor. A twelve-volt motor takes its power from the plane's batteries, or from automobile batteries if the exploring expedition is not using an airplane. The camera can be hand-operated.



Pictures Can Be Taken by Remote Control with This Motor-Operated Aerial Camera

Bell & Howell, 1803
Larchmont, Chicago

B. 801 Mrs. Loren A. Wolfe
Baltimore, Md.
cannot locate.



Supported by This Belt, One Man at a Time Can Slide Down the Rope

PORTABLE FIRE ESCAPE SAVES ONE AT A TIME

Fire victims may escape, one at a time, by lowering themselves to the ground in a safety belt that slides on a rope. The device is offered as a portable fire escape. One end of the rope is attached firmly in the room or hallway, and the belt is slipped around the shoulders. The rapidity of the descent can be regulated.

B. 953 ARROW IN MAMMOTH'S SKULL SHOWS MAN FOUGHT BEAST

Buried at the same depth as the bones of saber-tooth tigers and other animals that roamed the earth 20,000 years ago, a mammoth's skull containing an arrowhead has been found near a Florida beach. Scientists interpret the discovery as evidence that man and mammoth existed on the earth at the same time.

Rollins College
Winter Park, Fla.

demonstrated before Phila. Academy
Saf. A. P. Escape Corps. 5201 Elmer St.
Baltimore, Md.

Sam Muegg
Almond - 5/18/32

B 863

Put in service by City of
between Rome and Tivoli
POPULAR MECHANICS

286



End Warla

Here is the Latest in Automobile-Bus Transportation; This Vehicle Carries More Passengers Than a Railway Coach; in Addition to Passenger Accommodations, a Smoking Room is Provided

THREE-DECK AUTO BUS CARRIES EIGHTY-EIGHT PERSONS

Built with three decks, a motor bus with accommodations for eighty-five passengers has been constructed for highway service between Rome and Tivoli, Italy. A smoking compartment is provided, in addition to space for dogs and 440 pounds of baggage. The bus is thirty-three and one-half feet long, eleven feet wide and has a speed of twenty-eight miles an hour.

CAGES FOR TRAINING CANARIES STOP BIRDS' FALSE NOTES

If a canary in a California training school makes a mistake in its song, the

Darkness and Silence
Punish the Canary for
False Notes, Cage
Doors Being Closed



door of a specially built cage is closed for the day to silence the bird. That is one step in teaching canaries to sing. A trainer bird, regarded as one of the best in the United States and England, is surrounded by twelve young canaries, all in special cages. While the trainer sings, the other birds are kept quiet by doors that darken the cage. Then the singer's cage is closed and two of the young canaries are allowed to sing. If one of the "pupils" makes a mistake, the owner of the school closes that cage, and the bird is not allowed to sing again that day. The owner has developed a keen ear for tone quality and can detect faulty notes readily.

B962

ELECTRIC PLANT RUNS ITSELF AND SUPPLIES HOTEL

A weird sensation awaits the person who is familiar with the usual brilliantly lighted electric-power station, when he opens the door of an interior basement room in a New York City hotel and finds a complete Diesel-electric plant running by itself in total darkness. He hears the whirr of engines and generators, and, if he waits a while, a few clicks of switches and changes in running sounds give evidence that generating units are being started or stopped according to the consumption of electric energy. Such a fully automatic plant, of 150 kilowatts' capacity, has been in service for more than a year in the Hotel Chelsea, supplying the entire light and power system twenty-four hours a day, the equivalent of 2,300 fifty-watt lamps. There is no one in attendance,

*from to Automobile
General Electric
Co. 1855, 50 Church St. N.Y.*

*Chicago Pneumatic Tool Co.
Sprung off Chicago
Dr. Co. 44th St. New York*

B906

*Montebello
Calif.
Gold V. Cotton,
117 W. Washington*

*Fred Sprout,
Montebello, Calif*

*Edgar J. Kates
1350 Broadway
New York City*

B 9 7 2.

cannot locate
287
Ind. Encl. Kellik

as every necessary function is automatically controlled, and an occasional visit by a supervisor is all that is necessary to maintain the equipment in proper operating condition. Starting and stopping of the Diesel units are controlled by relays in the power circuit. When starting, current is delivered from the storage battery to the appropriate generator, causing it to act as a motor and rotate the engine. As soon as the engine is revolving at a moderate speed, a catch on the fuel-injection pump is released, whereupon the engine starts to fire and comes up to speed on its own power. When the newly started unit has built up its voltage to equal that on the switchboard, the main switch closes automatically and the unit delivers its proper share of the power. The entire starting operation, from the time the first switch closes until the Diesel unit is running at full speed and delivering power, consumes the remarkably short space of ten seconds. Whenever the power of the engines in operation exceeds the amount of electricity being consumed, the surplus energy is delivered into the storage battery. Furthermore, if for any reason the storage battery becomes more than two-thirds discharged, the relays are automatically energized and another of the Diesel-electric units is put into service until the battery is again fully charged. This unusual plant has been producing reliable power at a cost below one cent per kilowatt-hour.

B 9 7 2

DIVING ROBOT HAS MAN INSIDE TO OPERATE MOTORS

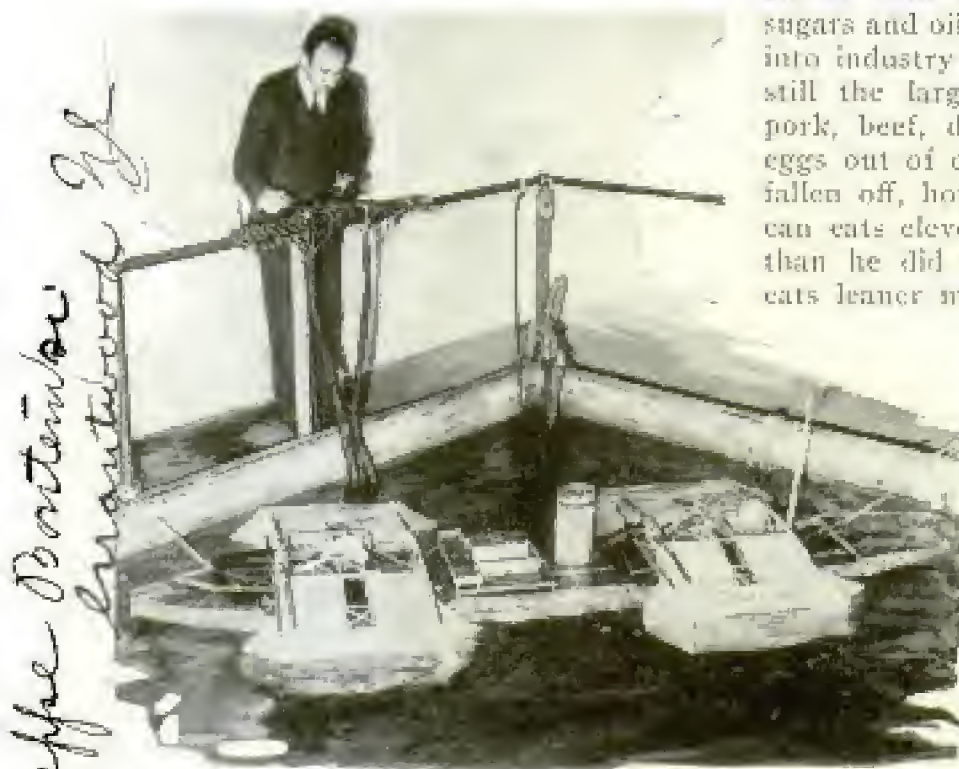
Driven about the ocean floor by electric motors, a diving robot that carries one person has been designed for undersea exploration or other work. The device has two long interchangeable arms that perform almost any work, controlled from the inside of the chamber. A window on each side and one in front of the operator give excellent vision, while a battery of



This Submarine-Like Device Can Move Back and Forth on Sea Floor; Note "Arms," Which Are Operated from the Inside

incandescent lamps light up the water sixty feet ahead. The operator's room is like the cockpit of an airplane and contains oxygen tanks, and controls for compressed-air tanks and for the arms of the robot. The operator is protected from excessive pressures and is able to work for long periods of time at normal air pressure with little help from the surface. Lowered over the side of a ship, the device sinks by taking on water ballast. Reaching the bottom, two motors, which receive their power from the ship by a cable, propel the submarine-like craft. Forward and backward motion is possible. When the work is completed, the fifteen-foot craft rises by expelling the water ballast. Air and power cables connect the diving chamber and the mother ship.

shown at Patent Exposition
see also Island Central Palace, New York
Nov. 1921. 1743



Model of Grappling Pontoons Intended for Salvaging Sunken Vessels in Deep Water; They Can Be Operated from the Surface

GRAPPLING PONTOONS TO RAISE SUNKEN TREASURE SHIPS

Through a form of grappling pontoons controlled from the surface, a New Jersey inventor hopes to be able to raise sunken treasure ships or submarines. Tests with a model of the invention have indicated, according to the inventor, that the submersible pontoons can descend to depths no diver can reach. The apparatus consists of a series of pontoons superimposed on a steel framework provided with steel grappling jaws. The jaws lock upon coming in contact with the vessel to be salvaged and cannot open until the weight is released. Once gripped around the ship, the pontoons are filled with compressed air until there is sufficient buoyancy to cause the apparatus and the vessel to rise.

RESTORATION OF CORN AS KING WAITS ON CHEMISTS

In the middle west where corn is king, a movement is under way to restore to higher estate this most voluminous and valuable of all agricultural products. It is a chemical attack, aimed at discovering

new ways of using the 2,500,000,000 bushels of corn grown annually. Starches, sugars and oils flow out of the corn kernel into industry and homes, but the farm is still the largest factory, manufacturing pork, beef, dairy products, poultry and eggs out of corn. The corn demand has fallen off, however. The average American eats eleven pounds less meat a year than he did thirty years ago. He also eats leaner meat, and lean hogs eat less corn. Vegetable oils have helped usurp the lard market and even corn oil competes with the fat of pigs fed on corn, while prohibition stopped the legal use of corn for whisky. Corn refineries each year manufacture nearly a billion pounds of corn sugar, over a billion pounds of sirup, more than 100,000,000 pounds of dextrin and 800,000,000 pounds of starch. This industry uses 75,000,000

bushels of corn, each containing thirty pounds of starch, and Dr. H. E. Barnard, director of the Corn Industries Research Foundation, sees starch as perhaps the most important of all the basic materials used by the chemist. He also calls it the least known substance in the world, and declares that if chemists studied starch as keenly as they have coal tar, they surely would find many new uses for it.

B926 SANITARY COVER ON BERRY BOX MADE OF CELLOPHANE

Berry boxes are now being covered with cellophane to make them more sanitary without detracting from display of the berries in stores. The cover consists of a cardboard collar containing a loose



sheet of moisture-proof cellophane. It is self-adjusting to all kinds of boxes and protects the contents against dust, dirt and contamination from handling.

Harry C. Atkins,
122 Broadway, New York
Leamer.

Science Service 5/18/31

B1006

new Sanseffe Pontoon: Invented



Placing a Bridge Span in Position; It Was Floated into Place on the Boats, Which Were Then Filled with Water Until the Span Was Lowered onto Its Piers

near Oneida Lake
**BRIDGE SPAN BUILT ON BARGES
IS FLOATED INTO PLACE**

All parts of a large bridge spanning the Oneida river at Brewerton, N. Y., were shipped by canal, assembled on barges and then the completed units were floated into position. The old bridge was removed in the same way. Barges, into which water had been pumped, were placed, one at each end of the main span. The water was then pumped out, raising the barges and thus lifting the old span so that it could be towed away.

B 884
**ACTORS PROJECT FROM SCREEN
IN EXPERIMENTAL MOVIES**

Motion pictures in which the actors stand out from the screen and appear in relief have been produced with experimental apparatus devised by Dr. Herbert E. Ives, of the Bell laboratories. Instead of a lens, the camera uses a four-foot concave mirror, like those for reflecting telescopes. It reflects the image on a transparent screen consisting of 200 minute concave grooves. Here photographic records of successive exposures are made; not on motion-picture film, but on small plates. Prints from the negatives are mounted on a large disk which brings them in slow succession into position in the projecting machine, while another smaller disk, rapidly rotating, flashes light through the lenses. The projection screen consists of 200 quarter-inch transparent rods whose front and rear surfaces focus

light to form the apparently solid moving images on the projection space. Because of the difficulty of obtaining accuracy of all parts, immediate commercial application of the principle is not expected.

**PENCIL HAS TINY LAMP INSIDE
FOR WRITING IN DARK** *B 865*

Writing in the dark is made easy by a pencil that has a tiny lamp inside. Enough light is thrown on the writing pad to make a drawing or to write. Designed for soldiers, airplane pilots and others who work in the darkness, it makes the writer independent of other sources of light.



This Pencil Has Its Own Light and Is Handy When No Other Illumination Is Available

will be agent known

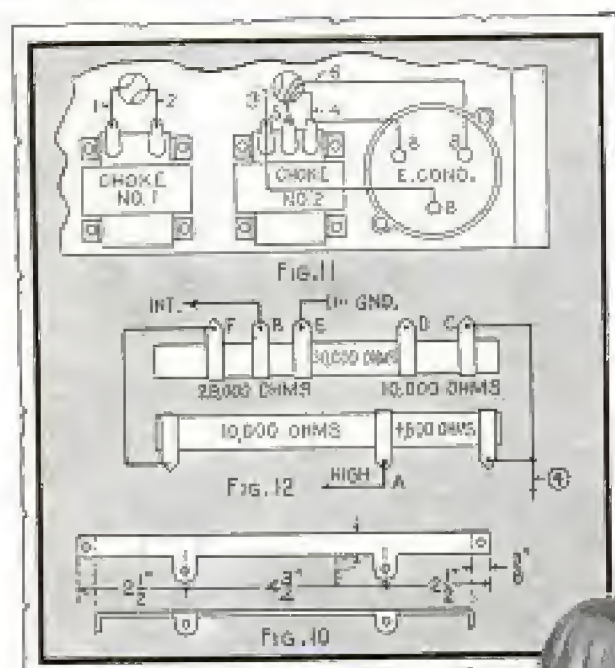
195 Broadway
463 West *New York*

Karl Hajder *11*
Munich, Germany
Alfred Schmidstr. 26.

A Modern Pentode Amplifier and Set Supply

PART II

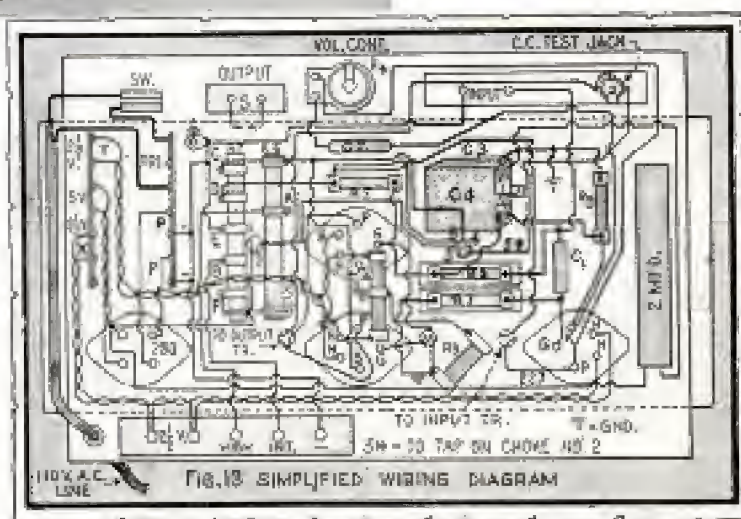
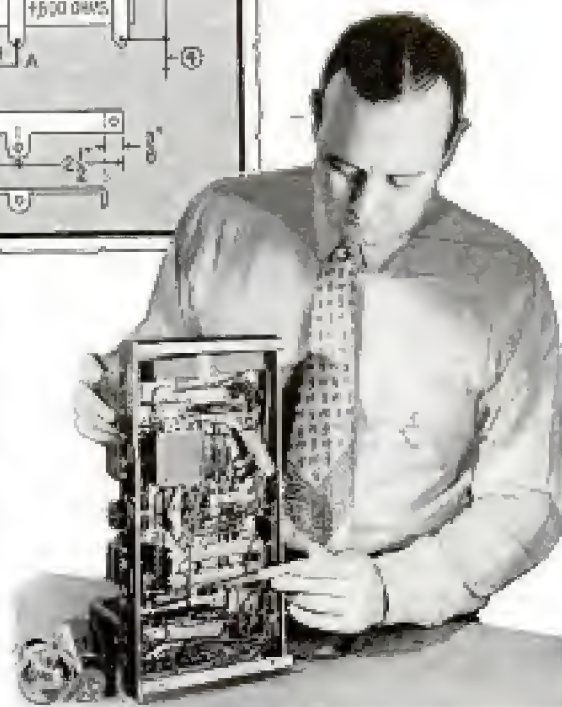
THE bracket for mounting the triple 8-mfd. electrolytic condenser is detailed in Fig. 10. This is cut from light sheet



metal, bent around the base of the condenser unit and clamped with a bolt. The mounting lugs on the bracket are bent out as in Fig. 11, which also shows the connections above the chassis, all wires being numbered so that they can be traced to correspondingly numbered leads on the underside of the chassis, Fig. 13. An enlarged blueprint layout is available if desired. The two 1-mfd. by-pass condensers C_3 and C_4 are placed one on the other and are bolted to the underside of the chassis. The transformer-terminal line-up will vary with the type of power transformer used. The 2 1/2-volt heater leads are indicated at X and Y. The small fixed condensers and resistors are fastened with stiff wires to connect them in the circuit. The center-tapped filament resistor, across

the 247 pentode-tube filaments, is soldered directly to the sockets, care being taken to fasten it to the same polarity. The lead No. 5 from the center tap on choke No. 2 goes to the jack, then through a hole in the chassis to the center of the output-transformer primary. All other numbered leads are easily traced. When the amplifier is completed, taps A and B on the voltage divider, shown in Fig. 12, are adjusted to supply the desired plate voltages. The other resistance values given between taps will be as shown. A voltmeter should be used for checking. When connecting the detector output to the input of the amplifier,

the ungrounded input terminal is for the detector plate and supplies current for it from the amplifier. To test current in the plate and screen circuits of the 247-tubes, a milliammeter is plugged into the jack. A total of between 75 and 80 mls should pass at this point. Motorboating is prevented by means of the 50,000-ohm filter resistance and the 1-mfd. fixed condenser connected in the resistance-coupled stage.



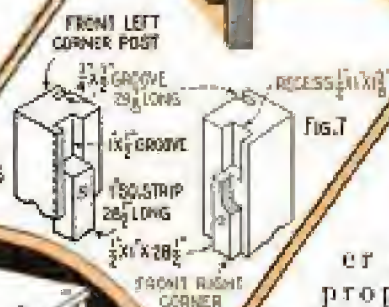
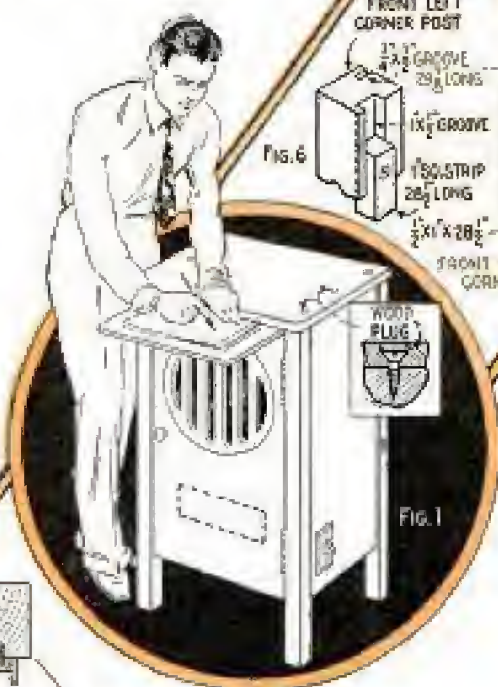
UTILITY CABINET

for Short-Wave Listeners

THIS cabinet is intended for the usual short-wave receiver with separate power unit. The sliding leaf is handy for making log notes and also serves as an armrest, which is necessary for the fine tuning required when distant stations are to be located. The large door makes an excellent speaker baffle and allows easy access to the interior. A small drawer or rack may be installed directly below the speaker shelf for the various short-wave coils and spare tubes.

There is ample room on the lower shelf for a power supply of any description, so that the cabinet is suitable for either a.c. or battery-operated sets. This shelf is placed about 2 ft. below the receiver, thus keeping the a.c. pow-

By
H. H. PARKER



er unit at the proper distance from the set for best results. An a.c. installation is shown in the photo, the line switch being mounted at the lower right-hand side of the cabinet as in Fig. 1.

The back of the cabinet is left open for ventilation and better speaker operation. The speaker should be mounted on a solid

shelf behind the grill, as shown in the upper photo. Utility and convenience are the main objects, and, although the construction is simple and the lines are plain, the finished cabinet presents a neat appearance. California redwood was used

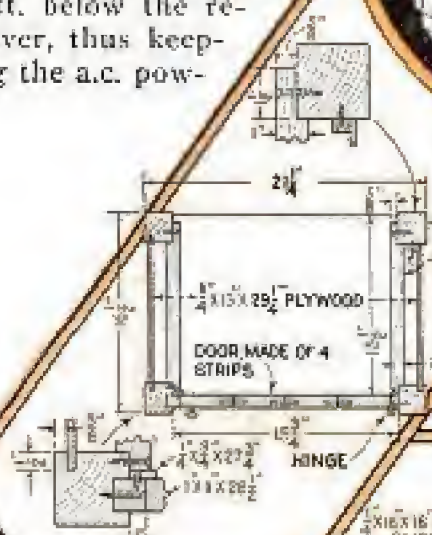


FIG. 5 PLAN, SECTION THROUGH A-B, FIG. 3 AND FIG. 4

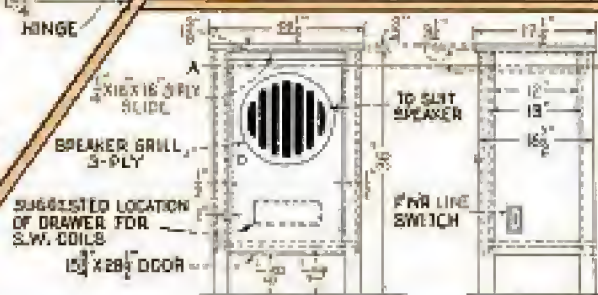
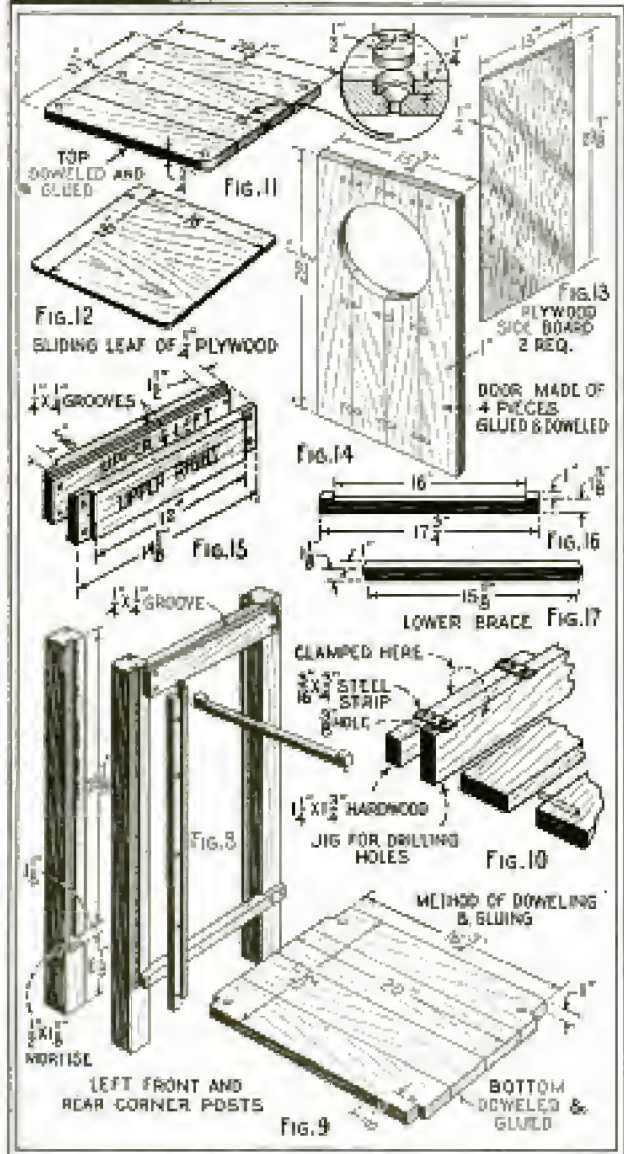


FIG. 3

FIG. 4



FIG. 2



except for the sides and slide, which are of three-ply fir; any good close-grained wood may be used, however. The finish will depend on that of associated furniture. A plain oil stain was given the original model.

The builder may find it difficult to cut the grooves in the corner posts for the side boards, shown in Fig. 13. The construction is indicated in Fig. 5, and an alternative method of fastening the side boards is shown at the upper right-hand corner post and the detailed sketch above. The plywood side board is glued and screwed to a $\frac{1}{2}$ -in. square strip instead of fitting into the groove, as shown at the other corners. This simpler method is mentioned at this time so that the side boards may be cut accordingly. As a suggestion, the grooves could be made by the lumber dealer, or if the builder has a small circular saw, parallel cuts may be made and the groove cleared with a narrow chisel.

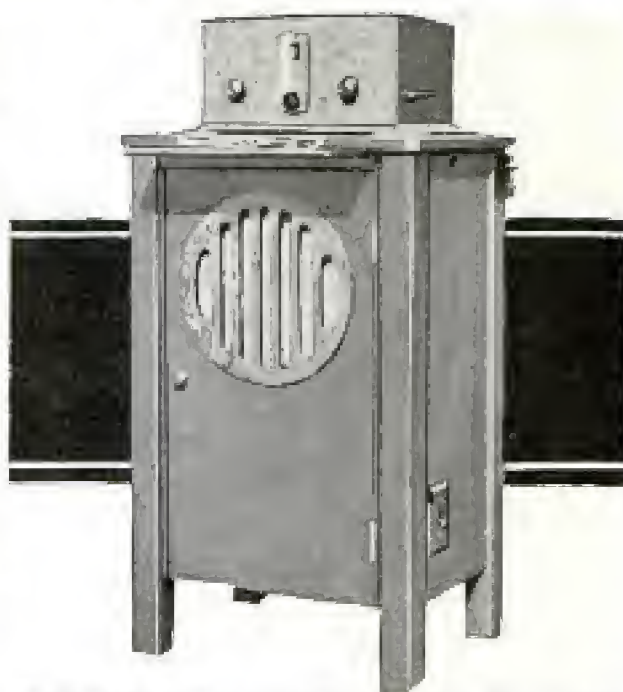
Figs. 2, 8 and 15 show the details of the upper inside horizontal braces grooved for the sliding shelf. A $\frac{1}{4}$ by $\frac{3}{4}$ -in. hardwood strip is fitted inside the door jamb and extends from the top of the bottom shelf flush with the top of the corner post. The door-jamb strip is $1\frac{1}{4}$ in. shorter, this detail being shown in Fig. 8. The shelf-supporting brace at front, detailed in Fig. 16, is also shown to clarify the assembly in Fig. 8, and the lower brace, Fig. 17, is also included. The left front corner-post detail in Fig. 5 is self-explanatory; the groove for the insert strip may be made slightly wider so that the strip can be screwed in, to allow a take-up to compensate for door shrinkage. This 1 by 1-in. strip and groove detail is clearly shown at the left in Fig. 7. The right front corner post is recessed to take the $\frac{1}{2}$ by 1-in. door strip, which is $28\frac{1}{2}$ in. long. All four posts are now placed into position and temporary braces are nailed across front and back to hold the posts $21\frac{1}{4}$ in. apart at front and back, as shown in Fig. 5, measuring to the outside of the posts.

The lower shelf, shown in Fig. 9, is to come even with the back faces of the rear posts and flush with the inside face of the door. It may be made in one piece, or several pieces doweled and glued as shown. It fits flush with the inside faces of the

plywood side boards and should be placed in position before the latter are mounted. Care should be taken that the shelf is square and the posts parallel to each other before the shelf is glued and screwed in position. The braces are now screwed in place, and the frame carefully squared before the door is hung.

The door construction is given in Fig. 14 and the method of doweling and gluing is indicated in Fig. 10. Pieces of strap iron are screwed to a wood strip and extend over the edge of the plank to be drilled. A guide hole is drilled in the overlapping ends of the strap-iron pieces and centered on the edge of the plank. The jig holes are $\frac{3}{8}$ in. in diameter and are spaced for the three sets of dowels. The diameter of the opening cut for the grill depends on the speaker used. The opening may be scribed, as shown in Fig. 18, and cut out with a keyhole saw. An accurate circle for both the grill and hole in the door was obtained by placing the point of a knife in a slot cut in a pivoted wooden strip. The grill is cut from plywood in any design desired.

If the doweling and gluing is properly done and the door clamped and well dried, very little fitting will be required. The door is hung on a pair of loose-pin hinges.



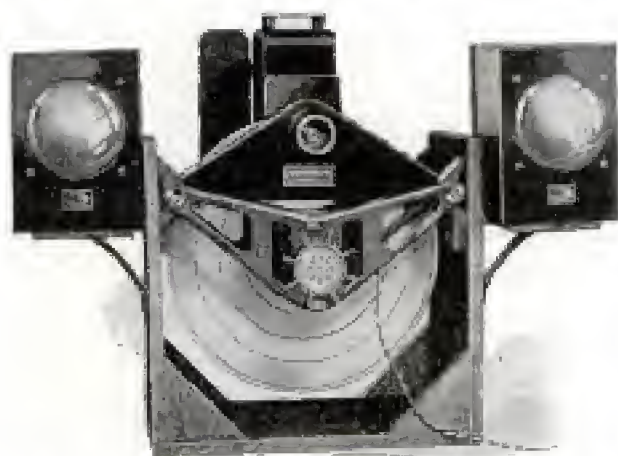
Short-Wave Listeners' Cabinet Houses Power Unit, Speaker and Accessories

The cabinet-top details are given in Fig. 11, and the method of inserting the corner screws is shown at the right and also in Fig. 1. The plugs should not be made from wood dowels; the grain of the wood should be parallel to the grain in the top boards. Wooden plugs of this type may be obtained from marine hardware stores, or can be whittled out with a pocketknife.

Amateur Television Transmitter

It is now possible for the licensed radio amateur to transmit his image along with his voice to other amateurs. The key and microphone have a helper in the form of photo-electric cells and a scanning de-

vice that converts varying sequences of light reflections into electrical impulses to accompany the modulations of the voice or key. With this assembly ready for use, the experimenter can devote his entire attention to the development of better circuits.



Television Transmitter with Scanning Disk and Light at Center and Photo-Electric Cells at Sides

Western Television Corp.
400 W. Madison
Chicago

Checking Parts for Iron Content

When buying cheap variable condensers, or other parts, for short-wave receivers, care should be taken that they are not made of iron. Very often such condenser frames are of lacquered iron to represent copper or brass. If the purchaser carries a small horseshoe magnet with him on his shopping tour, iron parts are easily detected.

¶ For further information on any radio construction article write to the radio department; this service is free.



Headphone on Extension Handle as an Aid to the Partially Deaf

Individual Headphones for Partly Deaf

A lightweight headphone of the type commonly used by radio amateurs and airplane pilots has been adapted for use in group installations to aid the partly deaf. One of the small phone units is mounted on an extension handle, and an adjustable resistance enables the user to regulate the volume to suit his needs. For auditoriums, churches and public-assembly installations, a microphone near the speaker is connected to an audio amplifier, and the output is wired to a group of seats where the headphones can be plugged in.

Test for Poor Antenna Connection

When the receiver volume decreases or static noises are continuous from day to day, regardless of weather conditions, the trouble will often be due to poor or broken connections between the set and the antenna. The lead-in wire may be touching the building or tree branches may be coming in contact with the antenna. If a window strip is used to bring the lead-in wire to the receiver, this strip may be defective or worn at the point where it comes in contact with the sash. A simple method to determine the efficiency of the antenna is to moisten the fingers and pinch the bare end of the lead-in wire near

the set. If the volume increases materially, look for poor or broken antenna connections.—Guy Newell, Bloomfield, N. J.

Short-Wave Super for Code or Phone

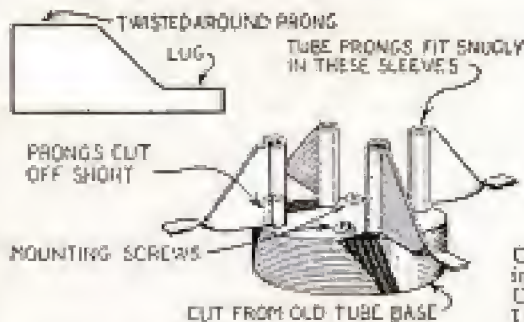
An intermediate oscillator for pure CW code reception is a special feature of this eight-tube short-wave superheterodyne. In addition the oscillator is of material aid when searching for distant phone carrier waves. The normal tuning range with three sets of coils is from 15 to 125 meters and the tuning system provides band spreading at any desired frequency within that range. With two additional sets of coils, the receiving range can be extended to cover the broadcast range. The receiver employs three 227's, two 235's, two 224's and a 280 full-wave rectifier. A 227 is used as an output tube to provide humless headphone signals at very low noise level. On all but the weakest signals, sufficient output is obtained to operate a loud speaker at moderate volume. For greater volume, an external amplifier is recommended. The receiver is housed in a cabinet 20½ in. long, 9½ in. high and 13 in. deep. Receivers of this type are used by several broadcasting stations for rebroadcasting short-wave programs from foreign countries.



A.C. Superheterodyne Receiver Designed for DX Short-Wave Reception

Blueprints covering radio construction articles in past issues can be obtained for 25 cents each; material lists are always available without charge.

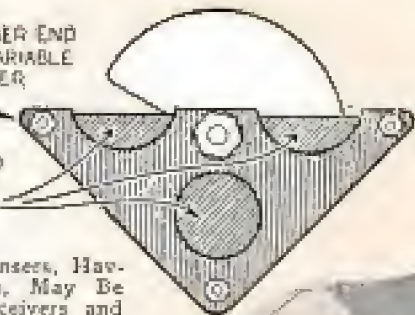
Practical RADIO Suggestions



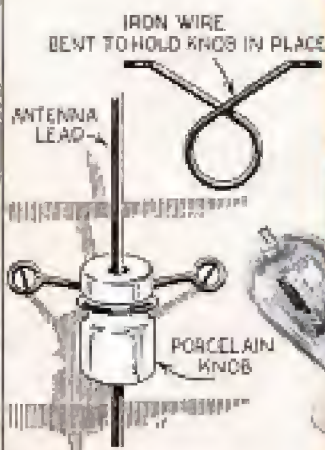
Lower End of Old Tube Base Makes Rugged Socket for Holding Tubes in Auto or Portable Receivers Where Good Contact Must Be Maintained under Rough Handling; Contact Strips Are Cut from Thin Copper or Sheet Brass

BAKELITE OR FIBER END PLATE OF OLD VARIABLE CONDENSER

BAKELITE CUT OUT TO INCREASE LEAKAGE PATH AND ELIMINATE SURPLUS BAKELITE IN FIELD



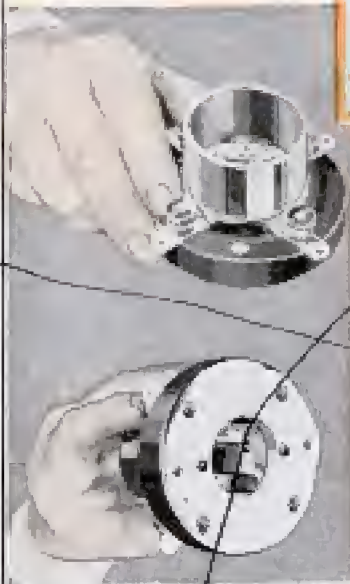
Old-Style Variable Condensers, Having Bakelite End Plates, May Be Used in Short-Wave Receivers and Low-Power Transmitters if Some of the Bakelite Is Cut Out as Shown



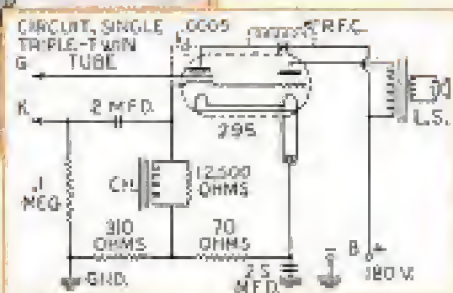
Above, Inexpensive Stand-Off Insulator for Lead-In, Made from Old Porcelain Knob; the Assembly Is Fastened to the Building with Wood Screws



Above, Small Cylinder-Type Fixed Condensers with Stiff Wire Terminal Leads, Handy for Under-Chassis Assembly in Compact Sets of Auto or Midget Variety; They Are Available in All Standard Capacities and Some Are Made in Double Units of the Same Value, to Save Space and Simplify Wiring



Above, the New Triode-Twin Tube Which Is Said to Have Three Times the Output of a '45, or Double That of a Pentode, without Increased Plate Voltage; It Consists of an Input and an Output Section Directly Coupled within the Tube; the Circuit Shows a Single Triple-Twin Supplanting a Complete Detector and Audio System; Left, Porcelain-Base Tube Sockets Designed for 50-Watt Amplifiers or Transmitters



Below, Torpedoe-Type Ground Unit, for Deep Ground in Dry Locations, Made of Rust-Proof Metal; It Is Driven into Ground by Means of Pipe Which Is Then Removed



Cable Radio Tube Co
230 W 9th, Brooklyn
New York

The Isatway Sales Co
818 Wyandott St.
Kansas City, Mo.

are
Carnell Electric Supply Co.
Albany, N.Y.
Long Island City, N.Y.

62 Johnson Co
Waco, Texas

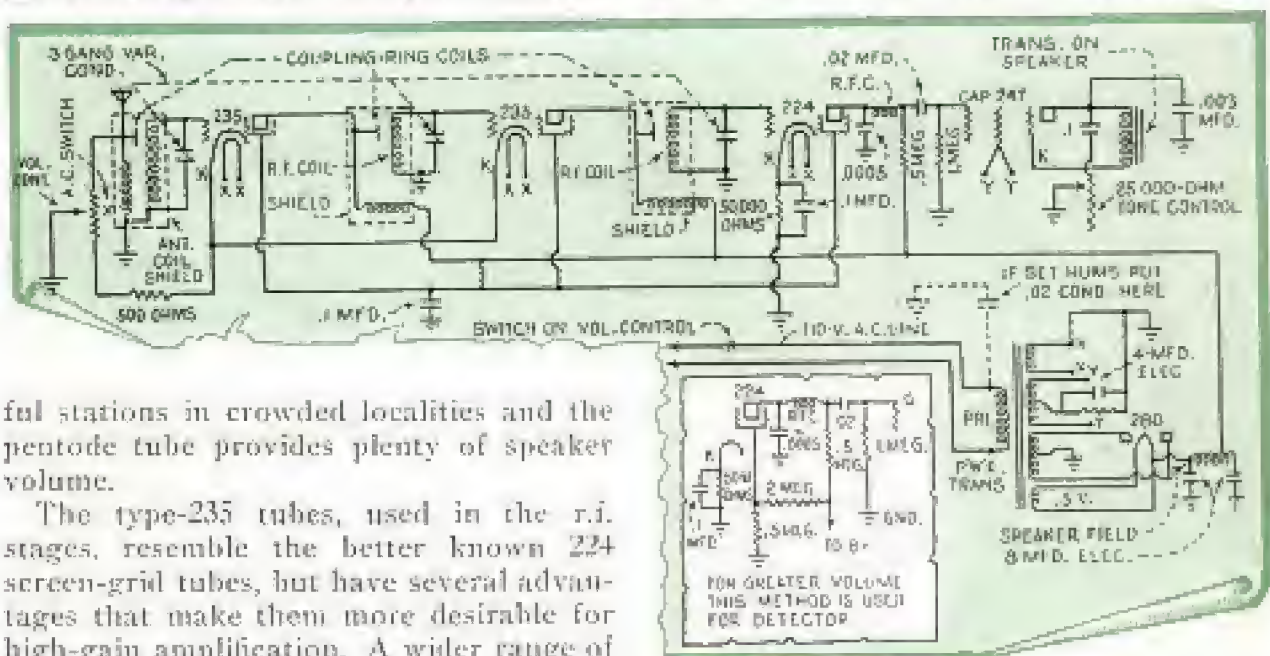
FIVE-TUBE *Uses*

By
ARTHUR B. COONEY



BUILT entirely of standard parts, this a.c. receiver offers the radio experimenter an opportunity to try out high-gain r.f. stages, power detection and the pentode output tube that will operate a dynamic speaker. The parts are not expensive, and the layout and wiring are quite simple. The tone quality is very good for a set of the midget type. It tunes sharply enough to separate power-

ful stations in crowded localities and the pentode tube provides plenty of speaker volume. The volume control is obtainable and "cross talk" is greatly reduced. The type-247 pentode tube is capable of giving a large power output for relatively small input signal voltages. It is designed for high gain and operates on 2.5 volts of filament supply, making possible uniform filament voltage throughout the receiver. The metal chassis, or base, is made of $\frac{1}{8}$ -in. craydo, $10\frac{1}{2}$ in. long, 8 in. wide and $2\frac{3}{4}$ in. deep. The compact arrangement of the parts is evident from the photo and layout diagram on page 297. The base may be easily cut and bent from sheet stock or purchased for a small sum. The completed chassis and dynamic speaker will fit into a cabinet $8\frac{1}{4}$ in. deep, $10\frac{3}{4}$ in. wide and 13 in. high at center. Such cabinets are available at



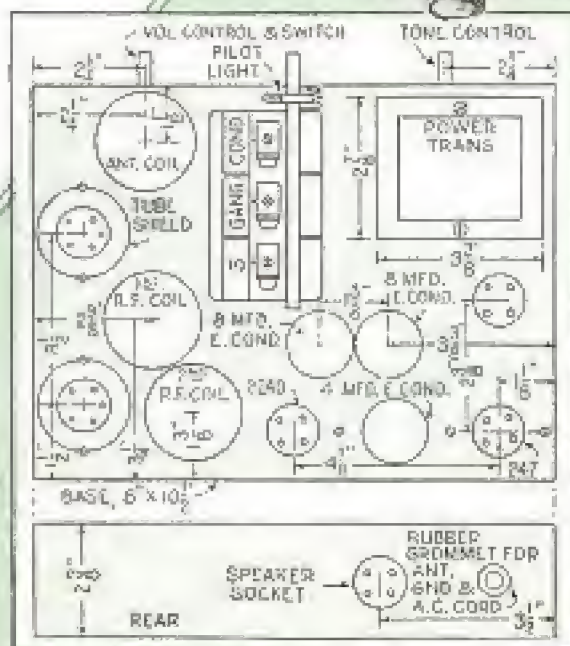
MIDGET

High-Gain Tubes

Part I

parts dealers and may be slightly larger, but not smaller, than the dimensions given.

Before cutting the opening in the chassis for the terminals of the power transformer, check the size of the hole required to clear the terminals below the chassis, as the dimensions given in the layout diagram may not suit the particular transformer you are using. The electrolytic filter condensers are bolted directly to the chassis, the metal containers are grounded on the metal chassis, and the insulated terminals extend below. The size of the holes to be cut in the chassis depends on the make of condenser. A small hole may



be made with a hand drill and enlarged with a tapered reamer. Holes for the wafer-type sockets may be made in the same manner, or a small circular cutting tool, fitting in a hand drill, may be used. The set will work with any standard midget r.f. transformers and those used in the model are of this type. Each coil comes complete in a metal shield ready for mounting on the chassis. One antenna coil and two r.f. coils are required. The manufactured coils have coupling rings that are indicated in the schematic diagram to the left.

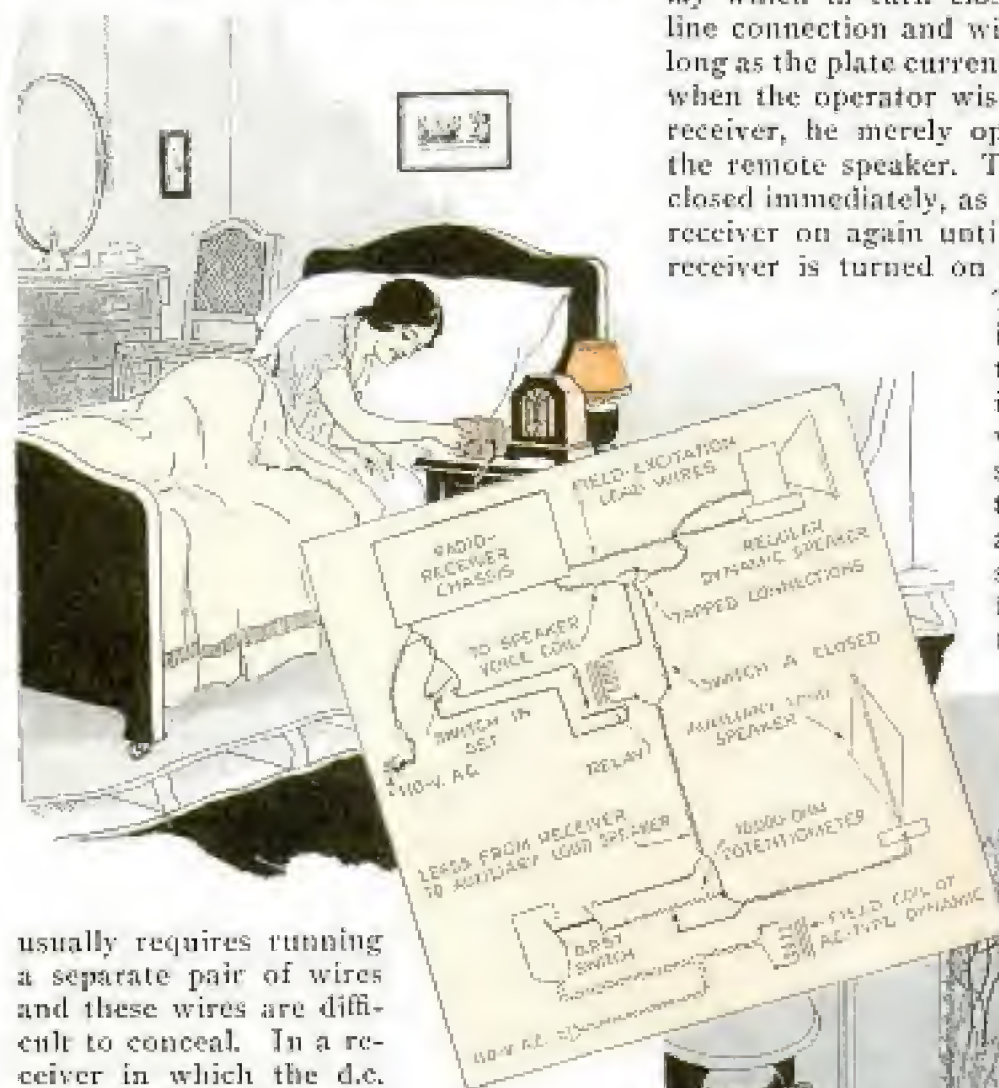
Homemade coils can easily be wound, and many experimenters may prefer to make their own. In this case, the coupling rings are omitted and suitable winding data will be given in Part II of this article which will appear in the September issue.

Installing Receiver Switch at Remote Speaker

Many unnecessary steps may be saved if some means is provided for turning off the set from the remote speaker. This

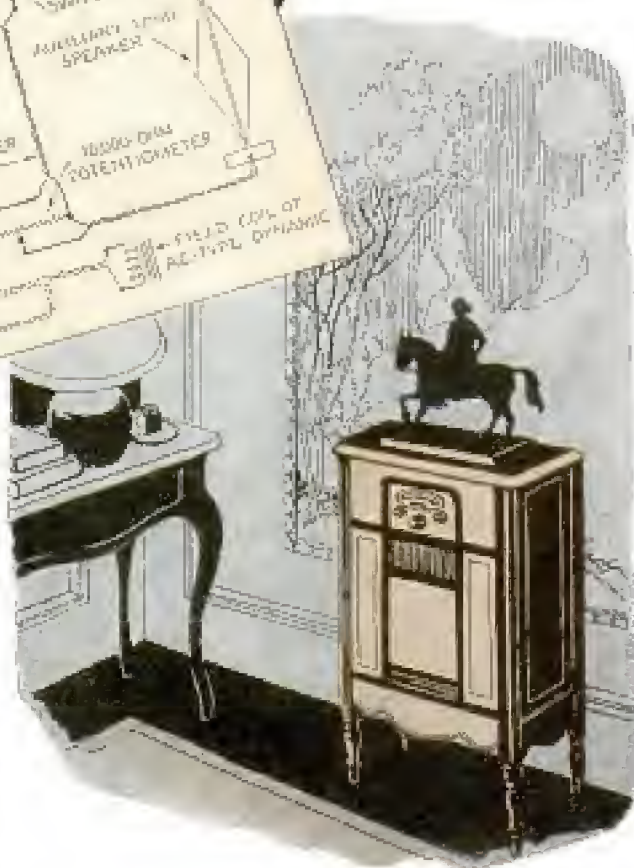
The switch at the set is immediately turned off, but the receiver remains on because the plate current has closed the relay which in turn closes the set supply-line connection and will hold it closed as long as the plate current remains on. Now, when the operator wishes to turn off the receiver, he merely opens the switch at the remote speaker. This switch may be closed immediately, as it will not turn the receiver on again until the switch at the receiver is turned on and off as before.

The third switch, A, is to be left open if the receiver is used in the usual manner without the remote speaker. The dotted-line connection at the remote-speaker switch is for controlling the field supply to the



usually requires running a separate pair of wires and these wires are difficult to conceal. In a receiver in which the d.c. plate current from the last tube flows through the voice coil of the loud speaker, it is possible to install the switching system shown in the diagram. A small telephone relay is required. The relay should close when energized by about one-third or less of the plate current used by your output tube, or tubes, in the receiver, and should be able to stand this current continuously without overheating. If the relay used has little separation between the contacts it is better to use a two-pole type and connect the contacts in series to obtain a multiple break effect. To operate the switching system, the receiver is turned on in the usual manner at the set, and the switch at the remote speaker is in the on-position.

dynamic speaker. If a magnetic speaker is employed at the remote point, a single-pole switch may be used.



AMATEUR MECHANICS

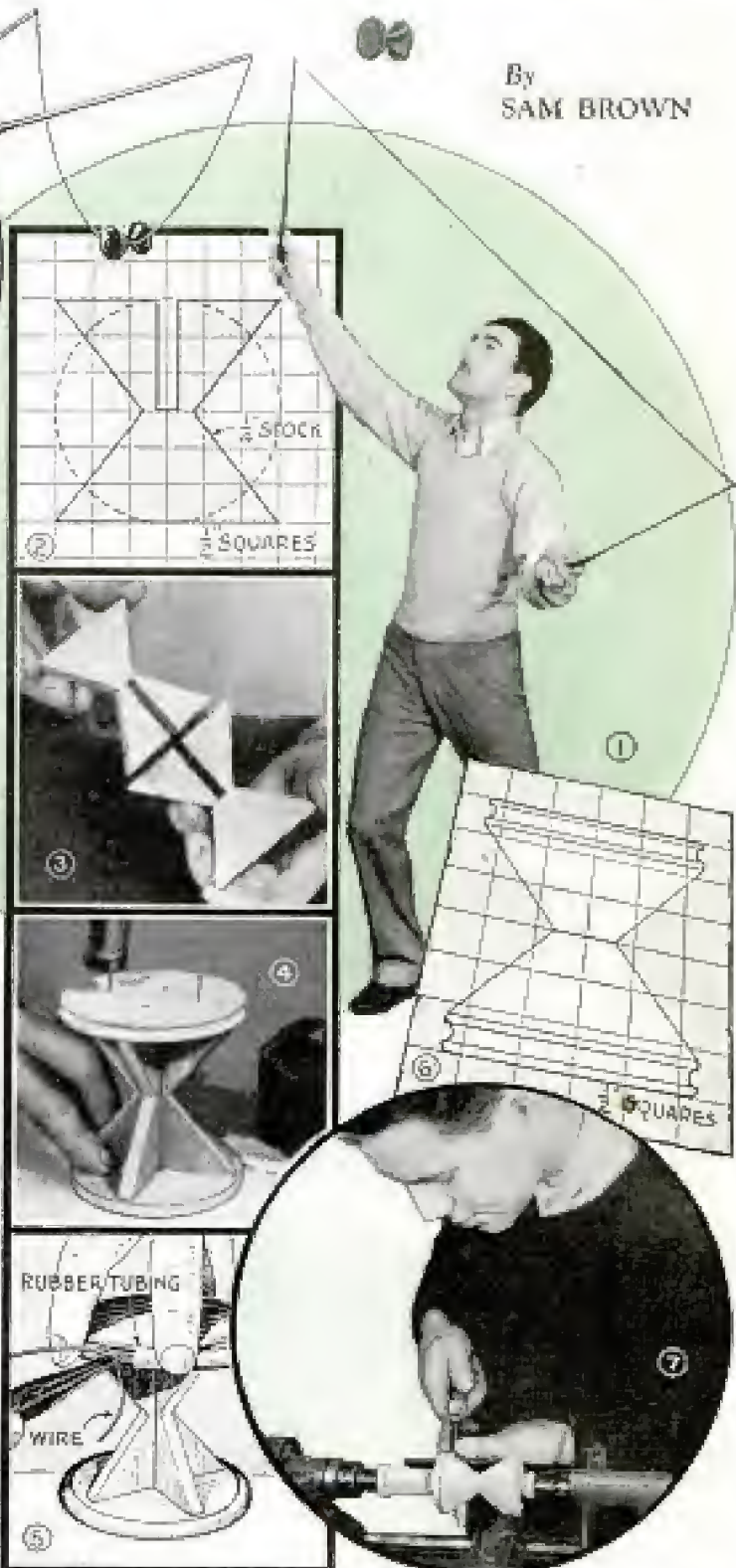


SPIN A DIABOLO FOR FUN

By
SAM BROWN

YOU have probably seen some clever stage entertainer use a diabolo as part of his juggling routine, or perhaps you remember when this toy was as popular as the "yo-yo." At any rate, spinning a diabolo is really a fascinating pastime.

To make one, cut from $\frac{1}{4}$ -in. wood two pieces of the size and shape shown in Fig. 2. Also, cut two circular pieces, 3 in. in diameter, as indicated by the dotted line. That done, you will find that the two V-shaped pieces slip neatly together, as in Fig. 3, offering a flat surface on which can be nailed two disks of wood, as pictured in Fig. 4. These circular pieces are grooved all around so that lengths of $\frac{1}{4}$ -in. rubber tubing can be used around the edges as a finish. Fig. 5 shows how the tubing is held in place by means of a light wire run through the center, and how the ends of the wire are twisted together tightly.





Best results are obtained by cutting the tube about $\frac{1}{8}$ in. oversize so that the joining edges will squeeze up snugly. Of course, the whole thing can be turned on a lathe if you happen to have one. If so, follow the template in Fig. 6 in order to get the proper size. In either case, care must be taken to have the finished diabolo balance perfectly or it simply won't spin. The rest of the equipment consists of two sticks, as in Fig. 8, fitted with a 5-ft. length of $\frac{3}{8}$ -in. cotton cord, which is threaded through the smaller end of each stick as shown in the detail.

Now that you have the outfit, let's see what can be done in the way of making

the diabolo spin. Start by placing it on the floor, directly over the cord and well along to the right hand, as in Fig. 9. Lifting up with the right hand sets the diabolo in motion along the floor. Then lift both sticks higher to clear the ground, keeping the diabolo rotating in one direction by moving the right hand up and down with a swift but not jerky movement, as indicated in Fig. 10. Don't rush. It is a common fault when learning a stunt like this to make the required movements too swiftly. Remember that the diabolo must gain momentum; it cannot be made to spin with lightning speed on the first whiplike stroke. Once you get the thing going, watch for any leaning tendencies and correct these immediately. This can be done by following the instructions given in Figs. 11 and 12—pulling the left stick in toward the body when the diabolo leans in, and pushing it outward when the diabolo starts leaning out. The right hand only moves up and down, the left being almost motionless except for the in-and-out

movement necessary to balance the diabolo. A half-hour practice session will find you the master. Then you can start on the more fascinating business of shooting the diabolo high into the air, as shown in the first photograph, and catching it again on its return. There's really nothing to this beyond keeping your eye on the spinning bit of wood and going at it smoothly. Once you have acquired some skill, you will find that an excellent game can be played by two players, standing some 10 or 15 ft. apart and throwing the diabolo between them.

Coil Springs on Tent Ropes

Small coil springs, tied in the center of tent ropes, will provide elasticity to keep the stakes from being pulled out when the ropes and tent shrink upon getting wet. It is a good idea to use steel or iron stakes, as they can be driven into the ground more easily and will hold better than wooden ones.

Novelty Belts You Can Make of Cellophane

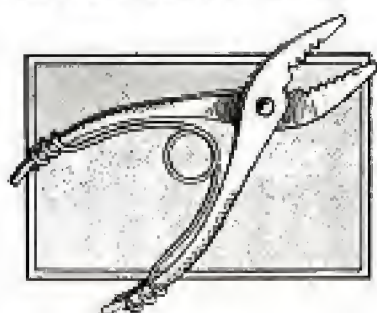


Either the plain, transparent cellophane, which is used extensively for wrapping small articles, or the colored variety, obtainable in sheets, is well suited as a material for making novelty belts. These, fitted with mother-of-pearl buckles, are both

strong and attractive. The cellophane is cut to pieces, $3\frac{1}{2}$ by $4\frac{1}{4}$ in. in size, and each piece is folded over in the center as indicated by the dotted line in Fig. 1. Then the edges are folded over again as in Figs. 2 and 3, forming a narrow strip, which is doubled as in Figs. 4 and 5 and the ends folded back inside as in Fig. 6. This piece is then joined to another, made the same way, by inserting the ends of the latter between the folds. Fig. 7, pulling both together firmly and continuing the process by adding other pieces in the same way.

Spring Improves Usefulness of Pliers

Attached to the handles of a pair of pliers, a spring makes them self-opening, which greatly improves their usefulness. A length of



spring wire is looped at the center and then wrapped tightly around the handles as indicated. When the handles come to-

gether, the spring pushes to one side so that the jaws can be closed.

Kerosene Keeps Rims on Bicycle Wheels from Warping

Warping of wood rims on bicycle wheels can be prevented by the use of kerosene. Pour a little around the base of each spoke about once a month. After several treatments, the rim becomes saturated so that moisture cannot penetrate the wood. The glue on the tire prevents the kerosene from affecting the rubber.

Sides of Auto Hoods Make Good Window Shutters

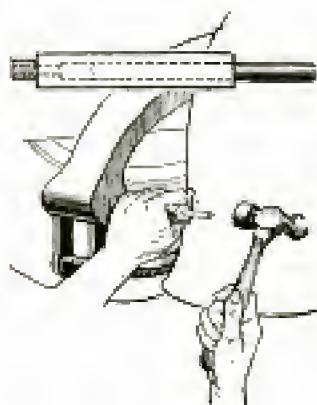


Window Shutters Made from Auto Hoods Permit Adequate Ventilation and Safeguard against Intruders

Bent portions of old auto hoods make good shutters for either garage or house windows. They are hinged to the window casings as shown, and a latch is provided on the inside. Such shutters are especially useful if you like to sleep with the windows open, and wish to safeguard your home against intruders. Painted to match the window frames, these shutters present a pleasing appearance.

A High-Pressure Grease Gun

Intended for use in forcing grease into shackle bolts and steering knuckles on cars, which are often clogged with dirt, this gun is improvised from two lengths of steel rod. One end of a 4-in. length of $\frac{1}{2}$ -in. rod is turned down and threaded to screw into the part to be greased and is drilled lengthwise,



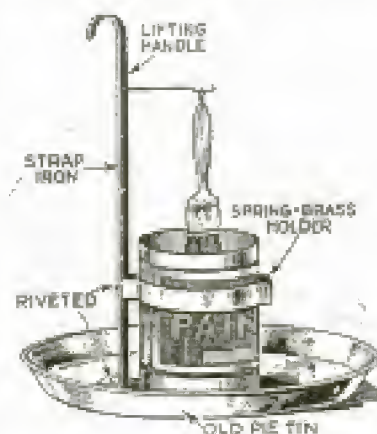
as indicated by the dotted lines, to take a $\frac{1}{4}$ -in. rod, which serves as a plunger. In use, the grease cup or gun nipple is removed, the gun is screwed into the hole and the grease forced in by tapping the plunger with a hammer.—J. Magis, Ciney, Belgium.

Developing Short Movie Films in Ordinary Tank

Short pieces of movie film can be easily developed in an ordinary kodak-film tank. The film is first removed from its cartridge and wound, emulsion side down, on a No. 116 film spool. This operation should be carried out in a dark room. The film is then threaded on a transferring reel and the developing done in the usual way. The advantage of this method is that the time-temperature system is used, which produces the best possible negative.—Francis J. Torney, Jr., Salt Lake City, Utah.

Paint-Can and Brush Holder

Consisting of an old pie tin, a length of spring brass and a piece of strap iron, this holder for a brush and paint can will not easily tip over. The strip of brass is shaped to fit around the can and is riveted to the strap iron, which, in turn, is riveted to the pie tin to form a handle. A short length of heavy wire, driven into a hole drilled near the top of the handle, provides a support for the brush, which has a screw eye in the end for this purpose.

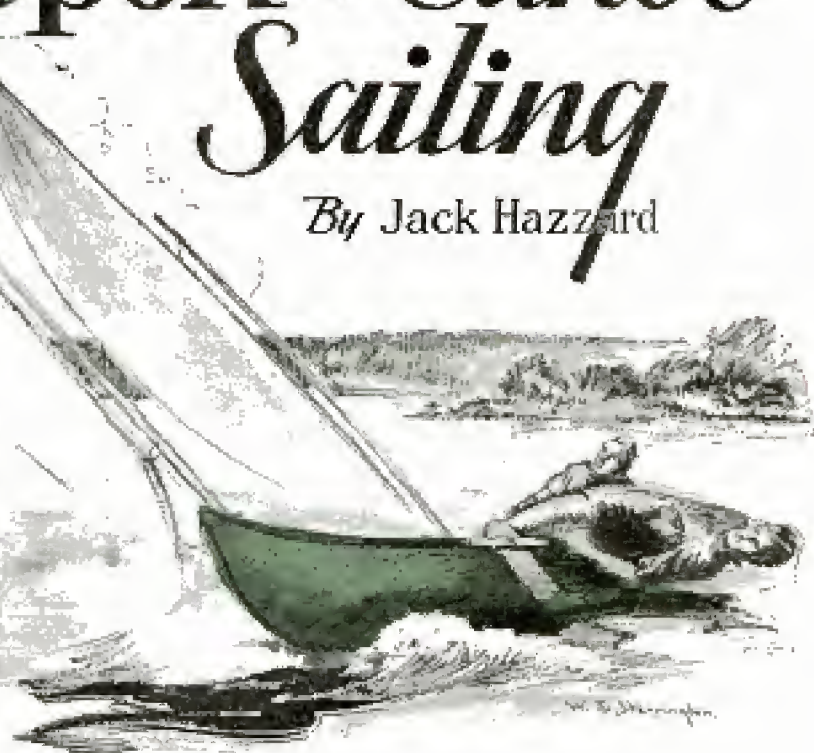
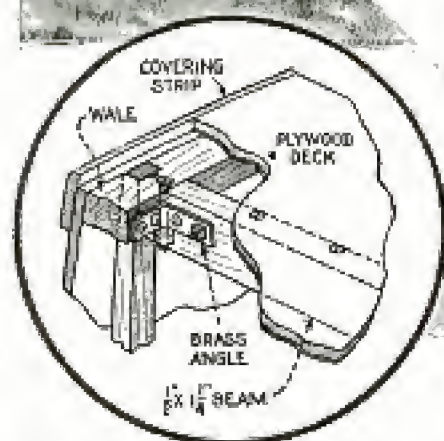


Auto-Casing Water Trough for Chicks

An old auto casing, cut in half through the center of the tread, makes two good water containers for baby chicks. These containers hold a considerable quantity of water, and are so shallow that the chickens will not drown if they get into it.

There's Real Sport in Canoe Sailing

By Jack Hazzard



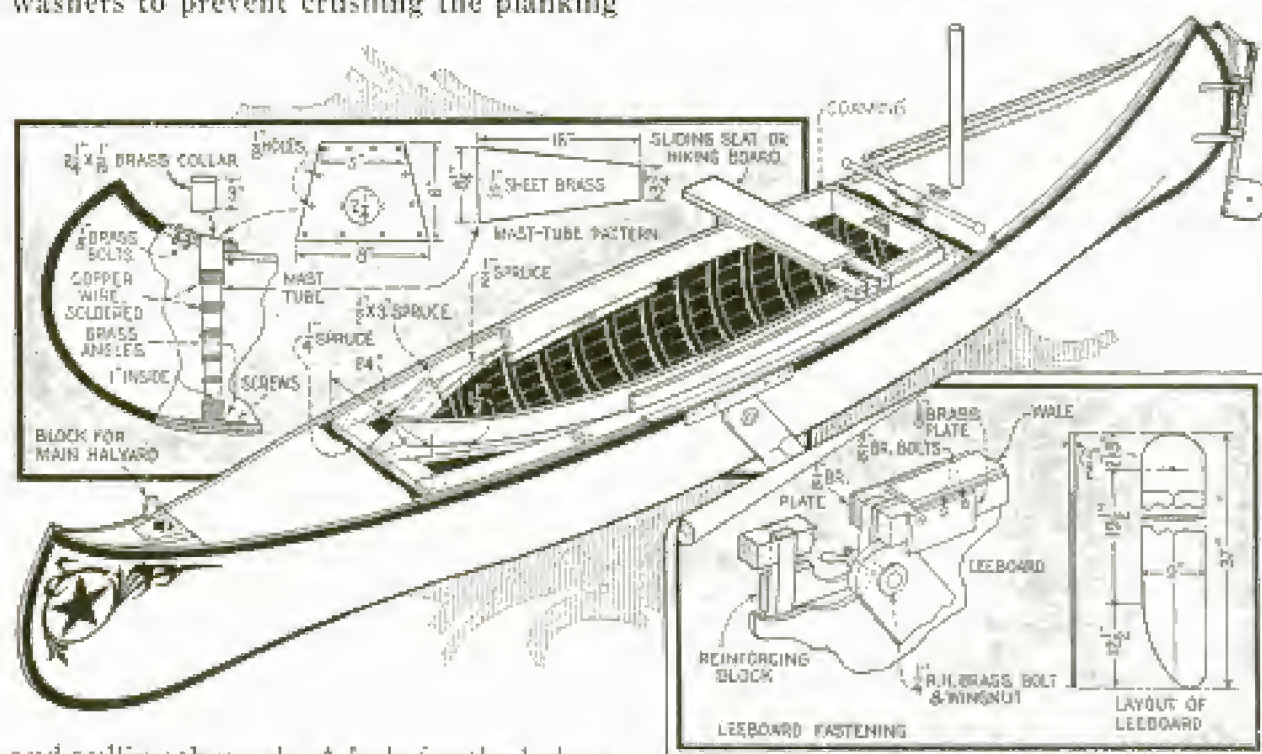
THIS tandem-sail, decked canoe combines the best features of three canoes holding champion records in the sailing club of Washington, D. C. The first detail shows how a stiffening frame of $\frac{1}{2}$ -in. spruce is fitted to the section inclosing the cockpit, the longitudinals being sawed to fit the curve of the sides, and coming close up under the wales to which they are fastened with marine glue and screws. Cross members are made from $\frac{1}{4}$ -in. spruce, glued and screwed to the longitudinals. Diagonals at the forward end of the cockpit are of like material and are similarly fastened. Along the inner edge of the stiffening frame is placed a $\frac{3}{8}$ by $\frac{1}{2}$ -in. strip of spruce, against which fits the cockpit coaming and upon which the deck is screwed. The coaming is of $\frac{3}{8}$ by 5-in. oak and firmly secured to the frame with flat-head screws spaced 4 in. apart. Between decking and coaming is screwed a molding of quarter-round oak. Either plywood or 6-oz. canvas makes a satisfactory deck. Seams should be located along the fore-and-aft center line and at either end

of the cockpit. After being tacked in place, it should be treated with airplane dope and painted. In assembling the frame and decking, liberal use should be made of marine glue. Every joint should be painted with it no matter how securely it is fastened, for decay begins at the joinings. Compartments and all inaccessible places should be painted with white, gray or tan valspar enamel. The greatest strain centers around the main mast, which is held in a tapering tube of $\frac{1}{2}$ -in. sheet brass, reinforced with a wrapping of copper wire, sweated on. A plate and collar, holding the upper end of the tube, are assembled and fastened as indicated, and a piece of sheet brass is soldered in the bottom of tube. The tube for the jigger mast is similarly made.

Spruce is the best material for the leeboards. They need not be over $\frac{5}{8}$ in. thick, tapering to $\frac{1}{8}$ in. at the edges and lower ends, leaving a flat surface to bear closely against the hull, as a close-fitting board sprays less water and offers less resistance. To support the leeboards, a rein-

forcing block of spruce, curved to the bend of the hull, and grooved to fit over the ribs and tightly against the planking, is screwed on each side of the canoe amidships. These blocks should be 2 or 3 ft. in length, from $2\frac{1}{2}$ to $3\frac{1}{2}$ in. wide and from 1 to 2 in. thick, depending on the shape of the canoe. For a very strong job run screws through each rib crossed. The screws should be fitted with countersunk washers to prevent crushing the planking

pressure, but not too freely. An athwartship tiller and slide is a necessary adjunct to the hiking board. The tiller itself is cut from hickory or ash and ornamented with knobs of some dark wood, such as walnut or mahogany. It should be 4 in. shorter than the hiking board. At least two cleats are necessary, a 3-in. for the main halyard and a $2\frac{1}{2}$ -in. for the jigger halyard. Some contrivance must be used to permit light-

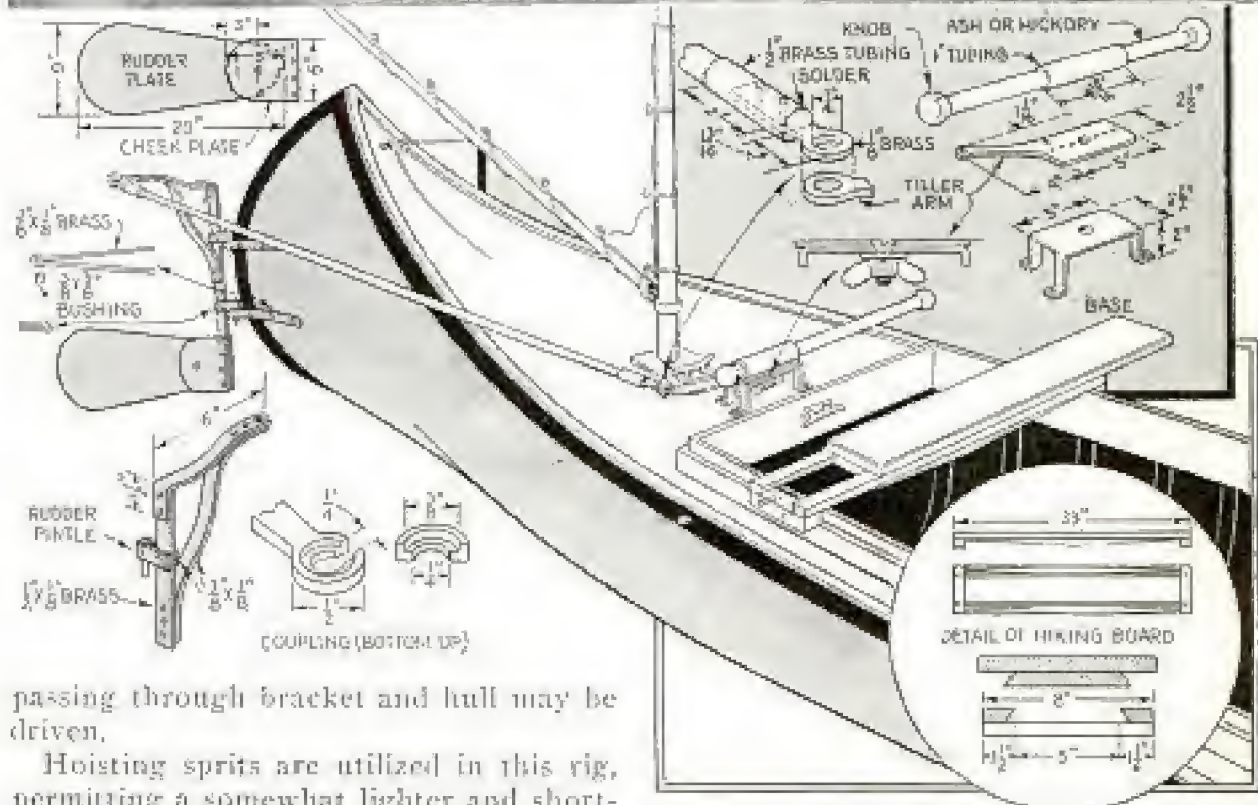


and pulling through. A hole for the bolt on which the board pivots is bored through the hull and the middle of the reinforcing block. If the fit is close, there will be no leakage when the boards are in position.

The sliding seat, or hiking board, is simple to construct. The rails are made of $\frac{1}{2}$ by 2-in. oak, one edge of each beveled at a 45° angle. They are held parallel by spreaders screwed underneath, at the extreme ends, and are fastened by bolts running through rails, spreaders and blocks fitted beneath, right through the deck and stiffening frame. The board itself is $\frac{1}{2}$ -in. oak as is the beveled strip screwed and glued beneath to engage the rails. At the center of the underside is fastened a stop made of heavy leather, screwed in place, to prevent the board from running off the rails. The length of the board and rails varies with different canoes but should be about 30 in. It is located 12 to 14 in. forward from the after edge of the cockpit. It should slide smoothly and easily under

ening trimming of the jigger, for while this sail is left strictly alone most of the time, it is necessary to trim it smartly when performing certain maneuvers, as when changing the course from a run to a beat. This cleat is merely the bases of two flattened cones, with the points removed and the small ends placed together. It may be of brass, aluminum or hardwood, and when screwed in place, will grab and hold a line firmly with only a single turn. Even half a turn will often hold a considerable strain as the tendency is to jam the line-tightener with any increase in pressure, while it can be cast off or made fast instantly with one hand.

The rudder is made of $\frac{3}{8}$ -in. cold-rolled steel. Its hangings are fastened to the hull with brass bolts going through the ribs. When the canoe is not fitted with an outside stem, it is well to fit a wooden block inside the hull into which screws

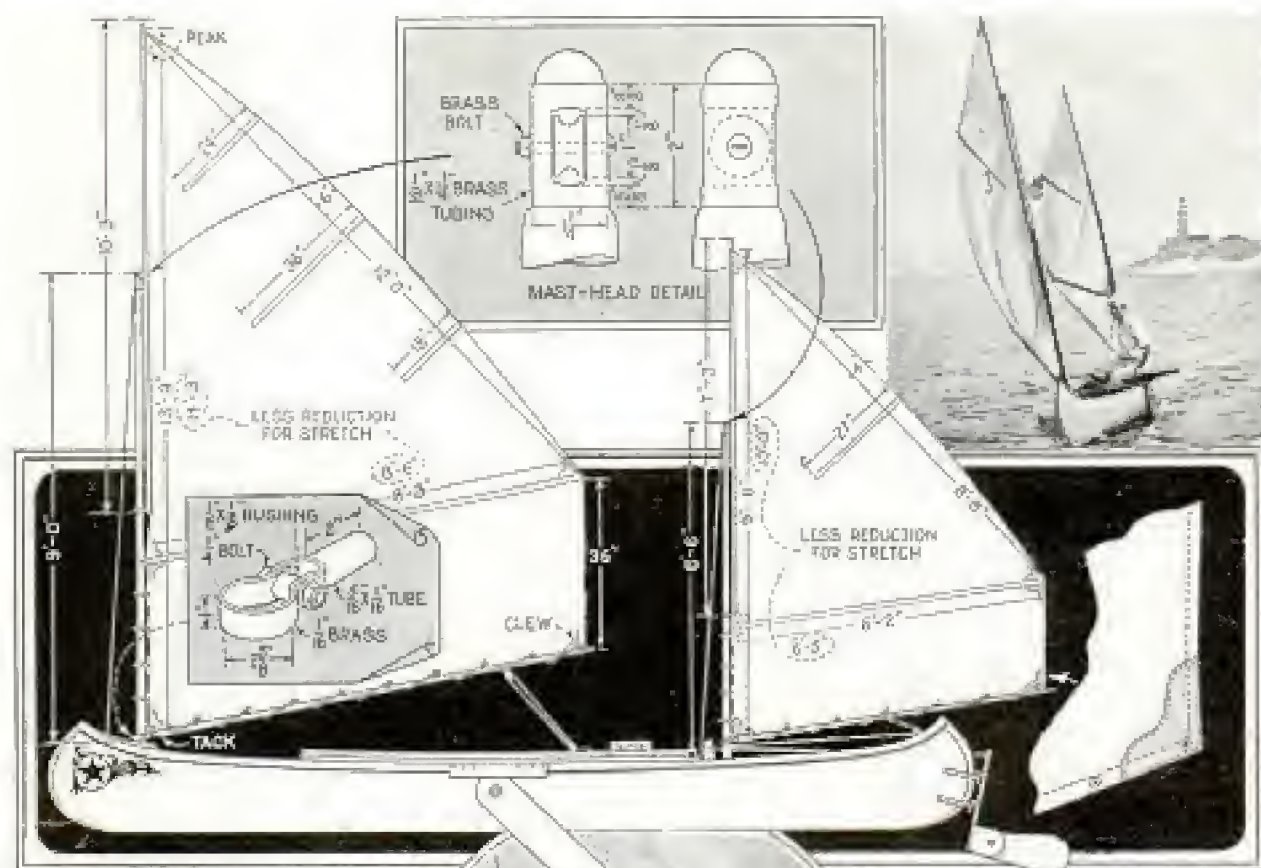


passing through bracket and hull may be driven.

Hoisting sprits are utilized in this rig, permitting a somewhat lighter and shorter mast than would be possible with other arrangements except a sliding gunter. Ordinary jaws are easy to make and will do if lashed in place to prevent unshipping, but hinged rings of the type described are much better as they never come off the mast and are also neater in appearance. The tubing, which fits the boom end, is hacksawed to a depth of 1 in., a piece, $\frac{5}{16}$ in. wide, being removed. The two projecting tabs are flattened, drilled and shaped, and the end of the tube is filled with solder for about $\frac{1}{2}$ in. The ring, which should fit the mast loosely, is bent, and a short piece of thick-walled tubing soldered between the tabs. When the bolt holding the two parts together is in place,

the fastening will be strong and flexible. Sprit fastenings should be large enough to come clear down to the tack but no larger, for excess size permits the sprits to sag off to leeward too much. The plan dimensions are for the main-boom fitting; jigger fittings may be smaller.

Unbleached muslin of good grade is suitable for the sails. Place the material in water to soak overnight to remove sizing. Pour off this water and place the material in a new bath and bring slowly to a boil. Hold at boiling temperature for an hour or so, moving frequently to prevent scorching and to make sure that all parts are equally treated. The cloth



will shrink nearly an inch to the yard in the process. Remove from water without wringing and hang to dry to prevent wrinkles. If wrinkles appear after drying, it is necessary to iron them out. Peg out the shape of the sails, as shown in the drawings, on a floor or on the lawn, stretch a chalkline from peg to peg and check dimensions. Slip the length of material under the lines at right angles to the chord, or, in other words, have the seams run parallel to the short battens. Leave the selvage on, lap exactly $\frac{1}{2}$ in. and pin each breadth to its fellow closely to eliminate basting. When the sail has been pinned together and cut with due allowance for roach, stitch the seams along each selvage, two lines of stitching to each seam. Reinforcing pieces are next cut and hemmed and those on one side basted in position. The chalkline, which has been shrunk with the sail material, is laid in the hem and the hem turned over the reinforcements. Additional reinforcements are cut, hemmed and applied to the op-



posite side of the sail. Care should be taken to see that the head and foot of the sail, which are cut on the bias, are not stretched. These hems should be $\frac{1}{2}$ in. wide when finished, of triple thickness, and stitched at least four times, as they must take the whole pull of the

sail and, if easily stretched, will let the sail get out of shape.

The long and short batten pockets are now made and applied, the short ones being tubes of sail material, while the long one is a 3-in. strip hemmed and stitched to the sail, open at both ends. The lower hem should be $\frac{1}{2}$ in. wide to take No. 0 grommets for reefing, and should be stitched three times. The grommets are placed 8 in. apart along the head and foot, and also along the hem below the long batten. Two more grommets are placed in the sail just at the leach, one each side of the long batten pocket in which are tied the stops holding the sail at the end of the batten. A small brass ring is buttonholed into the peak to take the halyard.

Waterproofing, by the sugar-of-lead and alum process, should follow the finishing work, because handling tends to remove the lead acetate in the fibers of the cloth. The short battens should be $\frac{1}{8}$ in. thick by 1 in. wide and are cut just long enough to fit the pockets loosely; if too long, disfiguring peaks appear at the batten ends.

Spruce spars are necessary, for this wood is stiff, strong and light. The wood should be close-grained and clear of knots. Spars should be laid out to oppose edge grain to wind pressure. The mast should have the grain running fore and aft, while the grain of the spars should run horizontally.

Four rings will be needed at each mast. These are made of $\frac{3}{16}$ -in. brass or copper tubing, a length of which can be wrapped loosely about the mast spirally, slipped off, sawed and soldered together. The resulting rings may then be clipped to grommets in the sail with little hooks bent from brass wire. Halyards and sheets as well as blocks are fastened to the spars before bending the sails. Clean away the varnish, lay waterproof cement and press the unlaidd ends of the lines into the glue, serve tightly with chalk or fishing line and treat the whole to a coat of shellac for protection. Blocks are fastened to the spars by threading them with a piece of line and serving the ends to the spar as described above. Braided line, about $\frac{3}{16}$ in. in diameter, is amply strong for bending sail. It is laced through the grommets in the edge of the sail and spirally about the spars, with comfortable slack to permit the sail to work itself along the spars. Do not stretch the sail out along the spars. Stops passing through small holes bored in the tips of the spars hold the sail in position. Paraffin is best for the lubricating blocks. It should be heated so that it will run into the small crevices.

Peeling Peaches or Tomatoes

When preparing fresh peaches or tomatoes for table use, the skins can be easily removed by firmly pressing the back of a knife against the fruit and drawing it from the blossom toward the stem end. This will bruise the skin sufficiently so that it can be peeled off without cutting.—Horace Lemaster, Maryville, Mo.



Removable Shelf
Fitted to Soda-
Fountain Counter
for Convenience
of Children

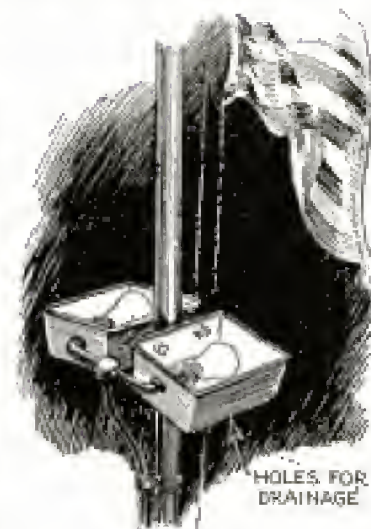
Shelf on Soda-Fountain Counter for Convenience of Children

A drug store in Detroit, Mich., uses the illustrated counter shelf to hold soda glasses when serving its small customers. It is a length of flat iron, bent to slip over the edges of the counter and supports a small sheet-metal table.

Baking Pans Reflect Light on Flag

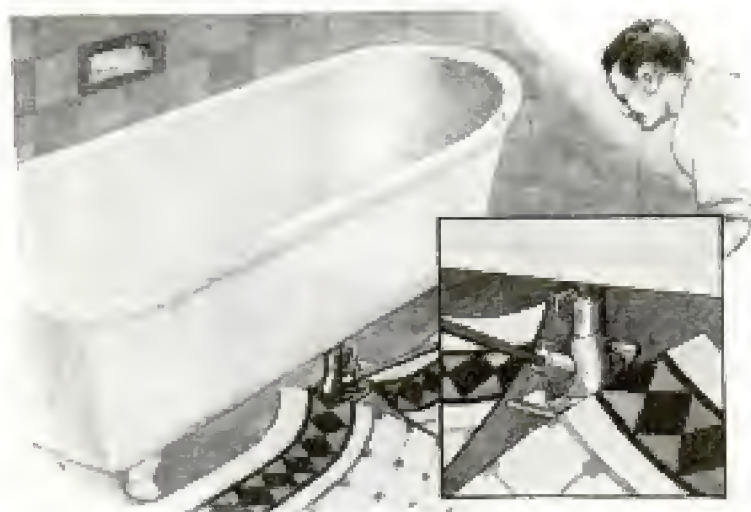
Two tin or aluminum baking pans fitted with electric lamps and fastened to the staff serve as reflectors to illuminate a

flag. The wires carrying the current to the lamps should run through a conduit to prevent any possibility of a short circuit. Small holes are drilled at the lower edges of the pan for drainage, or the pans covered with glass.



HOLES FOR
DRAINAGE

¶If fried foods are placed on soft paper when taken out of hot fat, most of the excess grease will be absorbed.



Laying Linoleum in Bathroom Simplified by Raising Tub with Auto Jack

Bathtub Raised by Auto Jack When Laying Linoleum

Linoleum is easily placed under a bathtub by raising it about $\frac{1}{4}$ in. above the floor with an auto jack placed under the center of the tub. Of course, the linoleum must be split in order to pass around the jack, but after the latter has been removed and the linoleum pressed down, the slit will hardly be noticeable, especially if the edges are cemented to the floor.

Awl Makes Anchor for Bob Line

An awl is especially useful as an anchor for a bob line, since it is easily moved when locating the bob. A spring-brass clip, of the kind used for dry-cell terminals, is screwed to the awl near the ferule, as indicated, to hold the line, which



is instantly adjusted by pressing down on the clip. Fastened in this way, a bob can be adjusted much easier than when a nail or screw is used to anchor it.

☛ A colander, turned upside down over meat in a frying pan, allows the steam to escape and at the same time prevents the fat from spattering on the stove.

Asbestos Keeps Pipe Flanges Tight in Intense Heat

Here is a good method of keeping pipe flanges tight when they are located in intensely hot places, such as a water-heating coil in a furnace. Build up a gasket of alternate layers of $\frac{3}{16}$ -in. asbestos paper and fine screen wire. Four layers of the wire and three of the asbestos are usually sufficient for forming a tight joint. Coat each layer of asbestos with white lead or a thick mixture of powdered graphite and oil. Then place the gasket between the faces of the flange, and tighten the nuts.

Joints made in this way have been found to remain tight for an indefinite length of time, even when used continuously.

Cigaret Lighter Filled with Aid of Pencil

The filler hole in a cigaret lighter being too small to conveniently pour in gasoline without spilling, you will find the task much easier by holding a pencil over the mouth of the can in the manner indicated. By slowly tipping the container a small stream of liquid will run down the pencil into the lighter. The same idea is also useful in filling other containers with small openings.



Oil Prevents Grass from Reaching Walk

Carefully applied to a trench after edging the lawn, used motor oil will prevent the grass from growing up and overlapping the sidewalk. Grass will not grow where oil has been applied, and hence care must be taken not to use enough to saturate the ground beyond the trench.

The BIG FISH

TAKES *the* AIR

THE sight of a huge carp swimming over the house tops would make any sky gazer think his eyes were playing him tricks. Although 14 ft. long, this kite weighs only 18 oz., and, properly constructed, will fly in a moderate breeze.

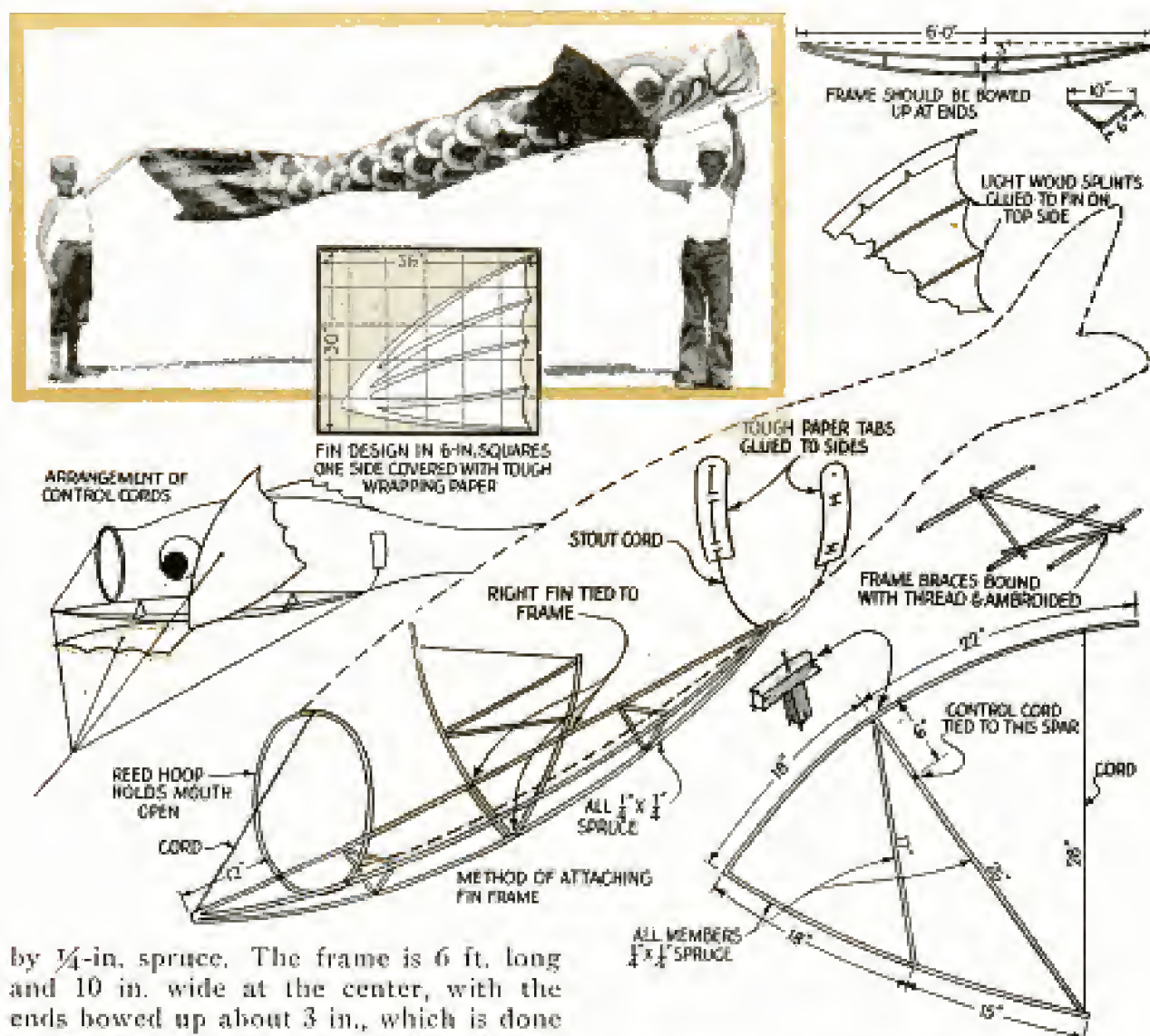
About sixteen 22 by 30-in. sheets of Japanese bamboo paper, obtainable from model-airplane supply dealers, are required for the body. First paste eight sheets together to make a rectangle about 30 in. by 14 ft. Lay it flat on a clean floor or driveway, with newspapers spread under it, and weight the corners and edges so that the paper will remain smooth while sketching in the design of scales, eye, gill, etc. Library paste, applied with a ½-in. brush, is more satisfactory than glue or mucilage. Before trimming away the waste around the outline, do all the painting.



Bamboo paper takes ordinary house paint nicely, although almost any other coloring material will do. After one side has been completed make another just like it but, of course, paint it to represent the opposite side. When dry, paste the two halves together at the edges except at the mouth and end of the tail. The mouth is held open by a reed ring or hoop, and the air passing through the body when the kite is flying keeps it inflated.

Next, make a triangular frame to carry the fins, which serve as wings to help keep the fish in the air. The best material is ¼

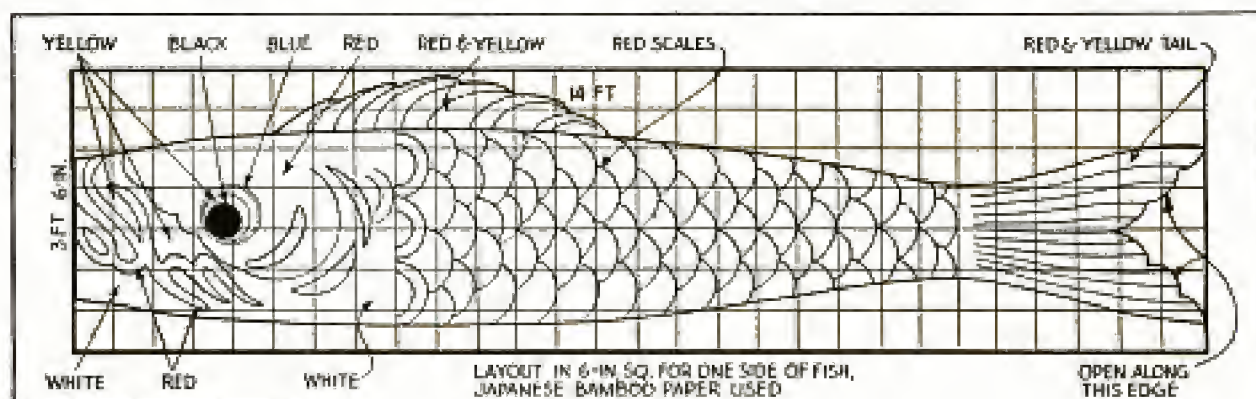




by $\frac{1}{4}$ -in. spruce. The frame is 6 ft. long and 10 in. wide at the center, with the ends bowed up about 3 in., which is done by making the bottom member longer than the side ribs. The triangle is rather flat in order to give the fins the proper dihedral for satisfactory flight. There are three triangular cross frames, bound and cemented to the longerons with stout thread and model-airplane cement. The fin frames are also of $\frac{1}{4}$ -in. spruce. Pins are driven through the curved members into the ends of spars, and are reinforced

with cement. A cord keeps the leading and trailing edges bowed until paper is put on.

The frame is covered with tough wrapping paper on the underside, the fin rays being painted before it is glued to the frame. The points of the scalloped edges are reinforced with thin wood splints glued to the paper. Glue, instead of paste, should be used on the fin job. The fins are bound



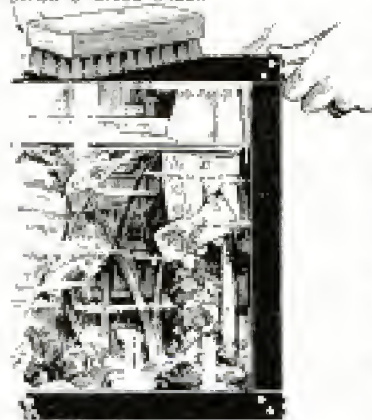
to the fuselage just behind the center cross frame, with the papered side down. After the reed hoop has been pasted in the mouth, it is tied to the frame about 12 in. from the forward end, and, just above the rear end, tough paper tabs, with strings inserted, are pasted to the sides of the fish. The strings are then tied to the rear end of the frame. Thus the "critter" is fastened at only two points and can undulate freely, permitting lifelike action. A control cord is fastened to each extremity of the main frame, and one to a spar of each wing. The apex of these four cords should come about 2 ft. below the front end of the main frame.

Rubber Blocks Check Brake Noises

Squeaks and drum howls inside the Bendix-type brakes can usually be overcome by the insertion of rubber blocks between the shoe and the tie strap of the cam bracket. This cushions the vibrations set up by the worn mechanism. Blocks cut from solid rubber tires are good for this purpose. They should be of a size to permit free action of the brake shoes, and sufficiently resilient to eliminate friction of metallic contacts.

Brush Removes Scum from Aquarium

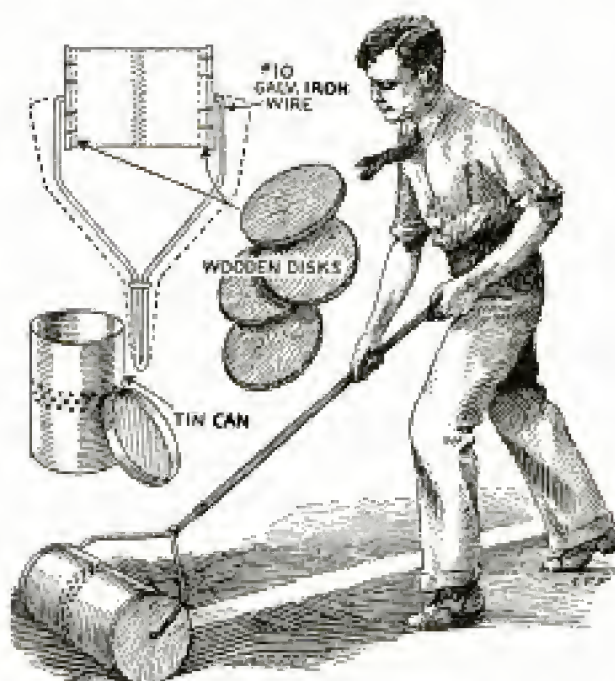
BRASS-BRISTLED BRUSH



Green scum that collects on the inside of an aquarium can be readily removed by rubbing it with a brass-bristled brush, obtainable for a few cents at any hardware store. The loosened scum will discolor the water for a while, but will soon settle to the bottom.

A Handy Athletic-Field Marker

This field marker is easily constructed from a 2-gal. tin can and four wooden disks, and has the advantage of being quickly filled. Place the can over a cylindrical block of wood and punch two or

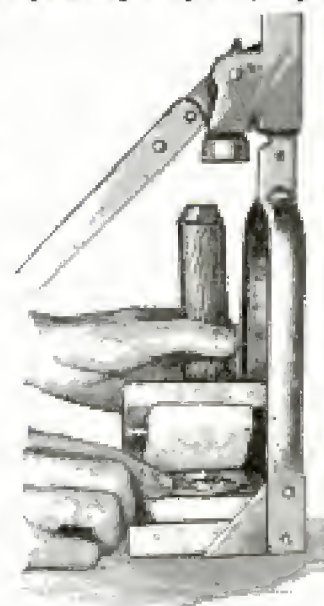


Easily Filled Athletic-Field Marker Made from Tin Can and Wooden Disks

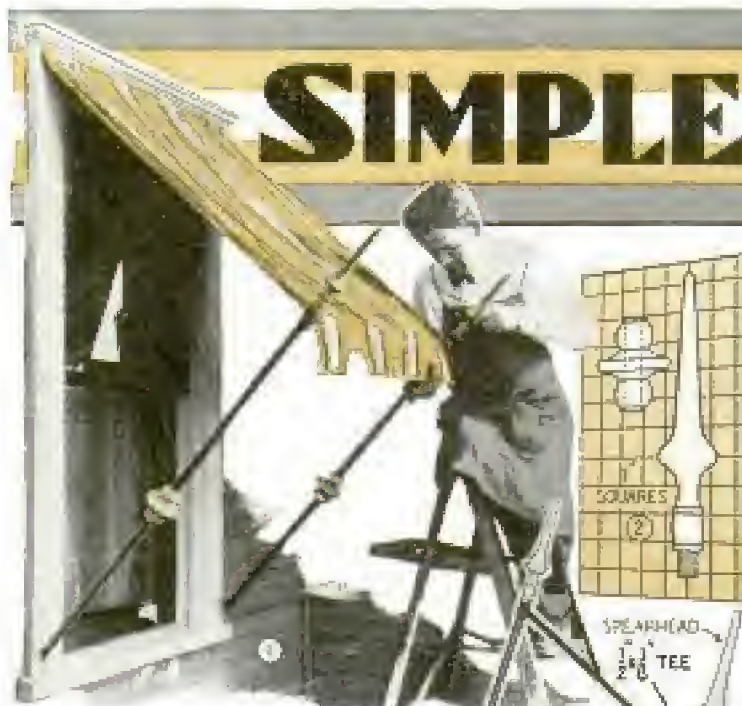
three rows of holes through the center. Then reinforce it with the wooden disks, two at each end, one inside and one outside of the can. The diameter of the outside disks should be slightly greater than that of the can to hold it above the ground. Heavy galvanized wire or small iron rod, bent to the shape shown and inserted in the end of a broom stick, provides a good handle.

Bottle Capper Furnishes Pressure for Making Wax Impressions

When making wax impressions of keys, medals or small art-jewelry objects, try a bottle capper for a press. Two cakes of beeswax are softened and wrapped in fine paper. The lower cake is placed on a solid block of wood, while the upper one is pressed over the article with a block of wood, provided with an extension to fit the cup on the capper.



SIMPLE STYLES



SPEARHEAD ornaments, with various modifications, are used extensively today with a plain pitch cloth to make simple and colorful awnings, which are particularly suited to Spanish and Italian architecture, but can be used successfully on almost any type of home if the canvas is carefully selected.

Fig. 1 shows an example of the spearhead type. This features the usual straight-pitch cloth, which need only be hemmed at the top to take the head rod, and at the bottom to take the frame crosspiece. The latter can be made up from suitable lengths of $\frac{1}{2}$ -in. galvanized pipe. A lighter rod will do for the front bar, if desired, and, in such a case, a reducer

tee, $\frac{1}{2}$ by $\frac{3}{8}$ in., is needed. The ends of the uprights should be hammered flat, filed to give a round section, and a $\frac{1}{4}$ -in. hole is then drilled as shown in Fig. 3, to fit the hinge indicated in Fig. 5. Two hinges are required. The $\frac{3}{16}$ -in. sheet metal used to make them can be easily cut on a scrollsaw or by hand. The side wings are bent at right angles to the proper position.

Suitable spearheads and frame ornaments can be turned from hardwood in a variety of pleasing shapes, as in Fig. 4. The shank is turned to a snug fit so that it will thread tightly into the open end of the tee. The ornaments shown can be held in place by means of metal or wood pins extending through the wood and pipe from side to side. The manner in which this type of awning is hung is quite obvious, the light metal head rod, which extends through the hem at the top of the awning, being held in place by two sheet-metal clips screwed to the window frame.

Another attractive design is the scroll-arm awning in Fig. 6. Here the frame is in the form of wrought-iron brackets, made up to the size and shape shown in Fig. 7, with variations, of course, to accommodate the



Spearhead Types of Awnings Are Particularly Adapted for Home Construction Because of the Simplicity of the Straight-Pitch Cloth Used



IN AWNINGS

size of the window for which the awning is intended. The manner in which the front bar is fitted is shown in Fig. 9, a cotter pin being used to stop the pipe while a rosette-shaped washer and a pipe cap hold the arm in place. Although the heavy iron has to be bent to the proper lines, the lighter stock in the center of the arm can easily be bent cold over a length of heavy pipe, as shown in Fig. 10.

Fig. 11 pictures a popular style of awning with a valance all around, to take away the bare edge and give additional protection. The battle-ax heads can be easily turned from wood, with the metal insert tightly secured by means of two small dowel pins, as shown in Fig. 13. Dimensions are given in Fig. 12, and a finished view in Fig. 14. No hems are used in the cloth, but the material is held at the front by means of two grommets slipped over the rod ends before the ax heads are turned in. Oblong grommets at the head of the awning fit over suitable screweyes, which take the place of the head rod used on the two preceding types.



Fig. 15, the square awning, is distinctly American, being used more extensively than any other. Either a head rod or grommets and screweyes can be used to hold the cloth in position over the frame, as in Fig. 16. The frames may be any of the three simple styles shown in Fig.



Venetian Styles with Scrollwork Supports and Valanced Designs Are Highly Effective When Used with Colorful Painted or Woven Canvas

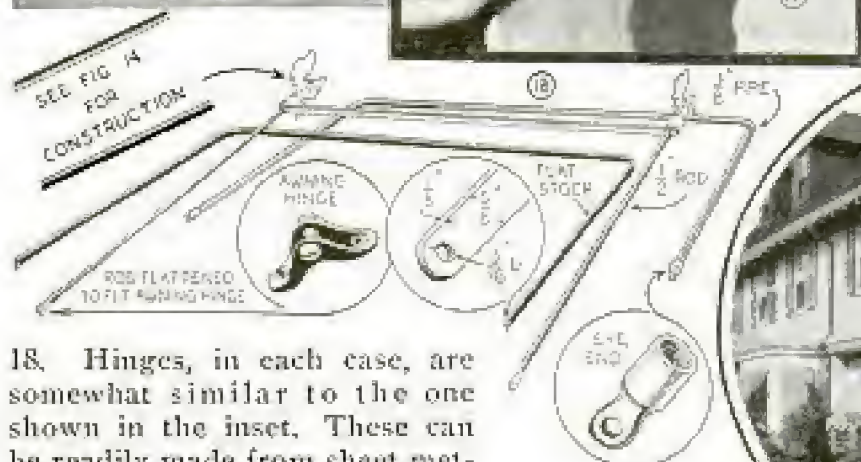




sary to use the double frame or hiproof style shown in Fig. 19, in order to provide the necessary clearance. Naturally, this style can also be used on other windows, if desired. The frame and hinge construction of such awnings is shown in Figs. 20 and 21, this arrangement permitting the two frames to come clear when the awning is pulled up. The photograph also shows the usual method of rope control, a light length of cord extending from the front bar through two screweyes on the window frame, and then down to a cleat.

On first-class installations, small pulleys take the place of the screweyes. If desired, the rope can be threaded through the framework of wooden or metal screens so that it can be worked from the inside.

The cloth for the dou-



18. Hinges, in each case, are somewhat similar to the one shown in the inset. These can be readily made from sheet metal in the manner already described. Besides holding the ends of the frames, as in the spearhead type, the hinge also catches the cloth sidewall, as shown in Fig. 17, a round grommet being provided for this purpose. Cutting the cloth for the square awning is a little more difficult than where only a straight-pitch cloth is used. If you contemplate making awnings for four or five similar windows, it is advisable to cut a paper pattern first, checking carefully with this, especially as to the angle of the sidewall pieces, before cutting the cloth. The usual width is 30 in., so that a seam on the pitch cloth is necessary if the window is over this width. With a little care, the seam can be sewed with a black thread preferably on a black stripe, to be invisible.

Where French windows or doors are to be fitted with awnings, it becomes neces-



ble-frame awning is cut much the same as that for the square type—a pitch cloth and two sidewalls. Seams should be run on the inside of the cloth to provide pockets for the two frames used. A plain painted cloth, with a suitable stencil in contrasting color, is often used in preference to the more colorful stripes. Simple stencils, like those shown in Fig. 23, can be easily worked on paint-

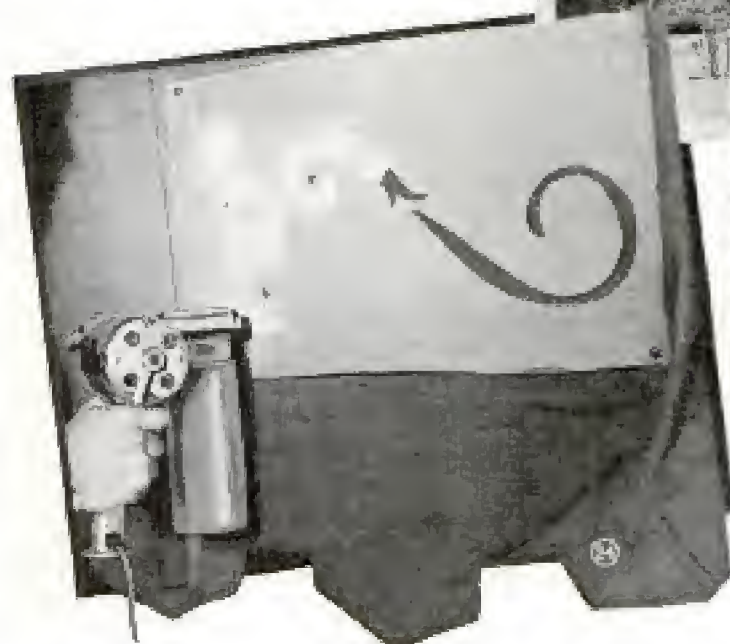


of paint will do. This is mixed with a small quantity of rubbing varnish and then thinned to a free-working consistency with turpentine. As

the cloth is already sized, there will be no tendency for the color to bleed out. The effect of a house equipped with stenciled awnings is shown in Fig. 22.

Naturally, awnings do not stop with the simple window types mentioned. However, with the

instructions given as a working basis, you should be able to construct frames and covers for the larger porch and terrace awnings which are made in almost the same manner.



ed or woven cloth by using a spray gun, as in Fig. 24, or with a double-thick camel's-hair brush. The canvas should be tacked to a smooth surface and the fabric drawn taut and firm. Any good grade

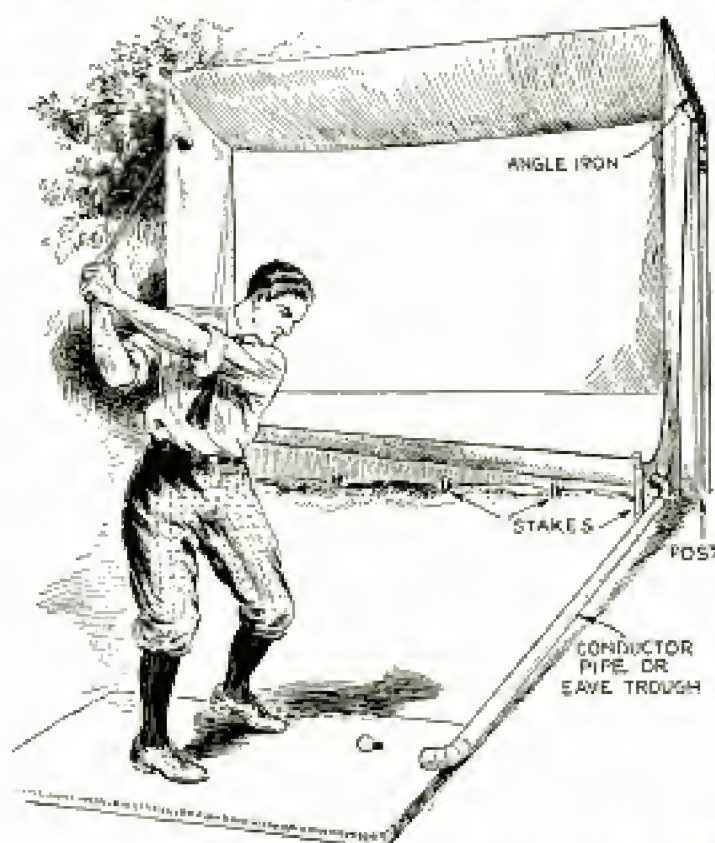
Spray Gun Fills Foundation Cracks

For forcing cement into cracks in foundations, an ordinary insect sprayer is useful. The receptacle for holding the liquid was removed, and the hole in the end of the tube enlarged. Near the upper part of the tube, a 2-in. slit was cut, and the ends were bent back to provide an opening for loading the gun. Pressure on the pump handle forces the concrete into the cracks, while the smooth tip of the gun puts an even finish on the surface. This method will also be found useful to force plastic compounds into cracks along door frames and window casings.—Ormal I. Sprungman, Minneapolis, Minn.



Cement Forced into Cracks with Altered Spray Gun

Golf-Driving Practice Net Returns the Balls



Save Yourself Steps When Practicing Golf Drives by Using This Net Which Automatically Returns Balls to Driving Mat

If you are a golf enthusiast and are making use of a practice net, you can save many steps by following the method

shown here, which automatically returns the balls to the driving mat. The canvas is stretched between two wood or pipe posts of suitable height, which are fitted with angle-iron brackets to support the top and sides of the net. The lower part of the canvas is rolled up to form a trough, which is held in position by means of stakes, and inclines toward one side so that the balls will roll in this direction, where they are caught in the mouth of a length of conductor pipe, also placed in an inclined position to return them to the mat. Such a net will be found handy when only a limited space is available for driving, and gives the user just as much practice as he gets on a regular course. Besides learning to drive the balls with speed, the amateur can become acquainted with the intended uses of the various clubs by noting the position at which the ball hits the canvas. For the driving mat a piece of carpet can be used. It should be located about 25 ft. from the net.—Fred A. Beard, Detroit, Mich.

Cellophane Holder for Car Records

A rectangular piece of cellophane, or similar material, makes a good holder for cards bearing records of oil changes, etc., in your car. The bottom and two sides are glued to the instrument board to form a pocket. This is especially useful where a card bearing the name of the owner and other information must be displayed in plain view.

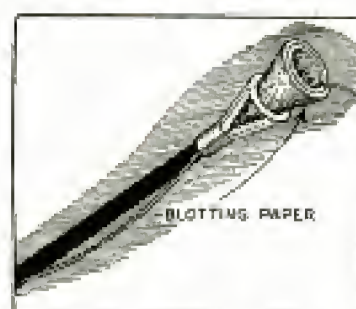
Gun Cleaner from Rawhide Thong

When the cleaning rod for a gun is lost and another is not available, one can be quickly improvised from a rawhide thong. Stretch and work the thong until it is soft and will hang straight down. Then cut a small slit in one end, insert a piece of clean cloth into it, and drop the other end through the gun barrel. Pull the thong through the barrel repeatedly until it is

clean, changing the cloth as many times as necessary. Oiling the barrel may be accomplished in a similar manner.—Forest Crossen, Boulder, Colo.

Blotting Paper Dries Fishline

Here is a novel method of drying your fishline as it is reeled in. With the line un-



reeled, a piece of blotting paper is rolled around it into a cone shape and inserted through the ring at the end of the pole as shown. Here it will wedge firmly and absorb the greater part of the moisture from the line while the latter is slowly reeled in.

Substitute for Rabbet on Round Picture Frames

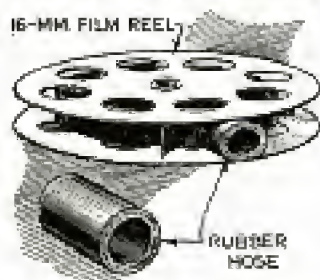
Being unable to use a plane to cut the rabbets on the back of a round picture frame, I made another frame from $\frac{3}{16}$ -in. plywood that was $\frac{1}{4}$ in. wider on the inside and glued it to the original frame. In this way, the projecting plywood made a good rabbet and the job was done much quicker than with the proper tools.—Joseph Minarovich, Berwyn, Ill.

Controlling the Cockroach

Scientists have found that cockroaches clean their feelers and feet in a manner similar to that of a cat, and have taken advantage of this habit to kill them by spreading sodium-fluoride powder around so the roaches will get it on their feet. This powder is a poison and kills them when it is taken into their system while cleaning their feet. As sodium fluoride is a poison, it should be handled with care and kept locked up to prevent poisoning of humans and domestic animals.

Hose Keeps Film from Unwinding

Film on partly filled reels can be prevented from unrolling by inserting a piece of rubber hose between the sides of the reel. Stoppers are especially useful when a number of partly filled reels of film are held for splicing.



Electric Lamp Eliminates Dampness in Pianos

Pianos, kept in basements or halls that are heated only occasionally, are soon ruined by dampness if no precautions are taken to prevent it. To do this, lower an extension cord fitted with a 25-watt lamp inside of the piano, letting the lamp hang near the bottom and keeping it lighted when the instrument is not in use. If the piano is kept covered, a smaller lamp will be sufficient.



Rope Rig Permits Steering from Any Position in Open Type of Outboard Boat

Rope Steering Rig for Outboard Boat

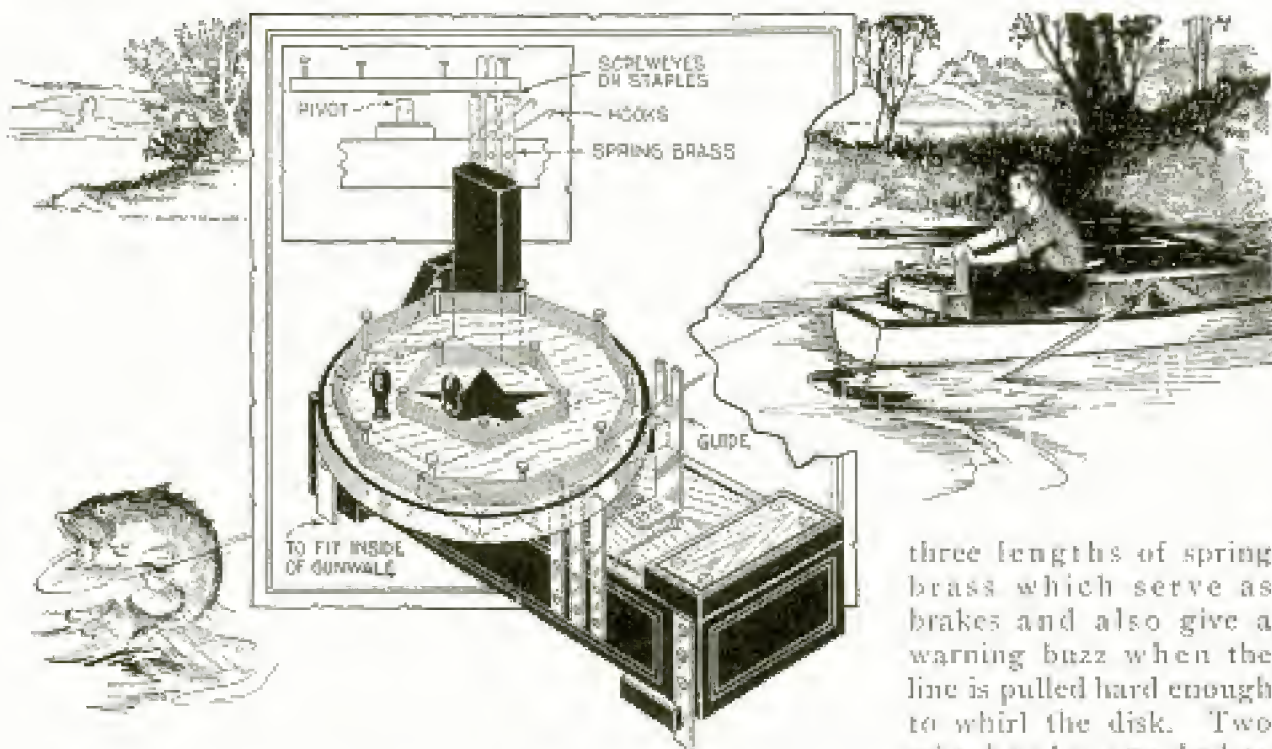
With two lengths of rope you can make a temporary steering rig to be used from any position in an open outboard boat. A short piece of rope is tied around the steering handle of the motor and to the sides of the boat, leaving about 3 in. of slack on each side. The ends of a longer piece are then tied to the first rope as shown. This arrangement is satisfactory for small boats of moderate speed when cruising in open water, but should not be used on high-speed boats or in crowded waters, as it does not give close enough control and makes short turns impossible.—J. D. Brubaker, Evanston, Ill.

Wire Brush Attached to Hoe

A wire brush can be used conveniently to scour or clean a floor by fastening it to a garden hoe as shown. A wooden block is sawed through at the same angle as that of the hoe, and the two pieces are then screwed to the top of the brush, so that the blade of the hoe will be held snugly between them. In this way, a handle is provided for using the brush in a comfortable position.



Fish Easily Played with This Trolling Reel



Simple in construction, this trolling reel is both sensitive enough to give warning when a small fish is hooked, and sufficiently strong to play the big ones. The line is wound on two rows of nails driven into a removable wooden disk, which is pivoted on a wood block and fitted with two handles. Three screweyes or staples on the underside of the disk make contact with

three lengths of spring brass which serve as brakes and also give a warning buzz when the line is pulled hard enough to whirl the disk. Two wire hooks, attached to the block, may be slipped over the springs to make them inoperative or can be fastened to the screweyes to hold the disk stationary. The block fits across the end of the boat, where it is held by two metal strips which fit inside of the gunwales. If desired, the block can be permanently attached to the boat.—K. W. Petzoldt, Kiel, Wisconsin.

Golf Tee from Garden Hose



A $\frac{1}{2}$ -in. section of garden hose makes a good golf tee. Punch a small hole in the side of the section and tie it to the handle of your bag where it will be handy when needed.—L. A. Wilke, Ft. Worth, Tex.

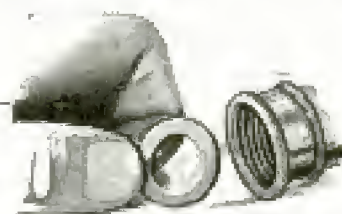
Bronze Paint for Outside Use

Weather-resisting bronze paint can be prepared by mixing 10 gr. of finely powdered potassium dichromate, 8 oz. of dextrin and 13 oz. of fine bronze powder. The preparation should be kept in small envelopes or cans and should be protected from light and moisture. To use the paint, dissolve the mixed powders in $1\frac{1}{4}$

pt. of water, and let it stand until all lumps have disappeared. A thorough stirring will prepare the paint for use. No more of the powder should be dissolved than is needed for the job at hand.

Pins Prevent Loss of Hose Washers

Loss of the rubber washers in garden-hose connectors can be prevented by cutting pins in two and putting the



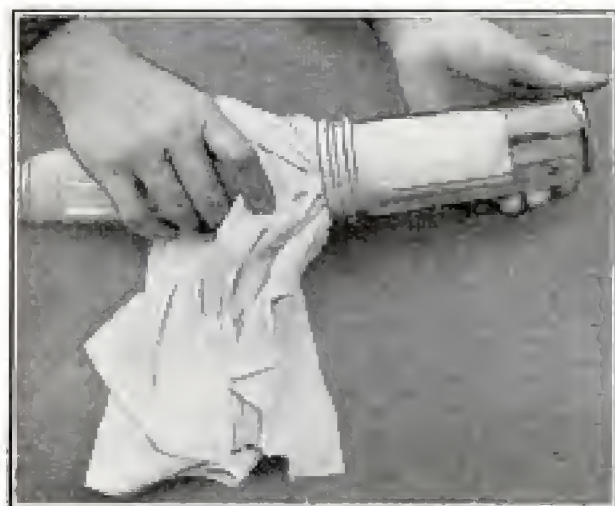
halves in the edge of the washer as indicated. The projecting heads of the pins are run down the threads and make it impossible for the washer to drop out.

How to Maintain a Good Lawn

Careful soil preparation is one of the most important items in reseeding an old lawn. The dead grass should be removed and the seed raked well into the soil, then watered almost continuously until it is high enough to shade the ground. Mowing the grass high, fertilizing the soil properly and keeping out weeds, do much to maintain a stand of grass after it is once started. Too much watering during the hot summer months encourages the growth of crab grass and weeds. Blue grass makes the best lawn, as it can stand dry, hot weather better than most other grasses, and will grow again in the fall even though it may get brown during the hottest months. Commercial fertilizer is probably better for lawns than natural fertilizers, which are likely to contain weed and grass seed. Ammonium sulphate or sodium nitrate may be mixed with water, 1 to 1½ lb. for each square rod of lawn. A heavier application may cause the grass to burn.

Wiping Jars and Tumblers

Glass tumblers and similar containers can be wiped dry on the inside by using a roll of newspaper and a towel. Roll up



Jars and Tumblers Quickly Wiped Dry on the Inside with a Roll of Paper and Towel

enough of the paper to make a stiff core and place the towel over it, then slip the assembly into the container. By allowing the roll to loosen up, the towel will be forced against the sides and bottom of the container, which is then wiped dry by twisting the paper.



Wheeled Truck, Made of Pipe and Fittings, for Transporting Heavy Outboard Motors

Cart for Transporting Outboard Motor

A truck for transporting a heavy outboard motor is easily made from two small wheels and some pipe and fittings. The axle consists of a length of pipe fitted with tees. Two other lengths are bent to form the handles, and are screwed into the tees, after which nipples are screwed into the ends of the tees to serve as wheel spindles. To hold the wheels in position, caps are screwed onto the nipples, while a wooden crosspiece bolted between the handles provides a support for the motor. —Bert Ruthenberg, Wauconda, Ill.

Fan Blows Dust Away When Beating Rugs

On a calm day when you beat your rugs on the lawn, set an electric fan on the windward side of the rug. When beating it, the dust will be blown away by the current of air from the fan instead of rising and settling back on the rug. —Gordon R. Magnuson, St. Paul, Minn.

Waterproofing Old Boat Hulls

Leaky boats can be made water-tight with a melted mixture consisting of 30 lb. of rosin and 10 gal. of tar. To make the compound, melt the rosin and add the tar while stirring constantly. After it has been applied, the compound will set very quickly.



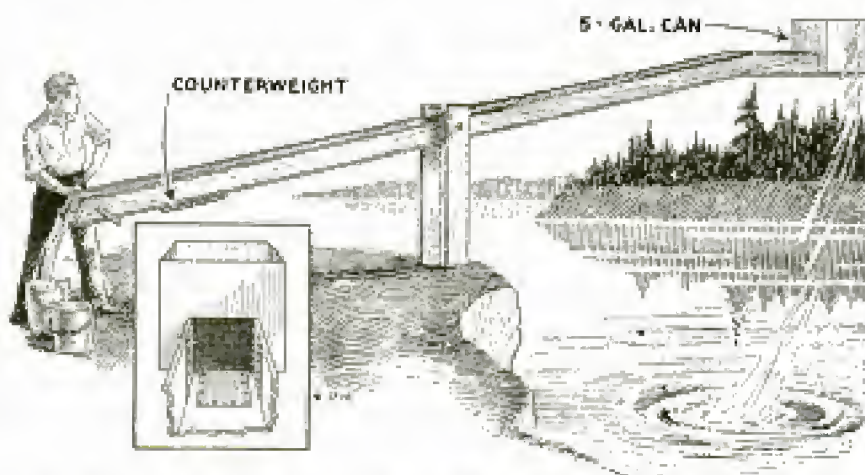
Door Pull Enables Dog to Open Screen Door without Scratching

A Door Pull for Your Dog

Attached to a screen-door knob, a block of soft wood and a rope enables a dog to open it. It is comparatively easy to teach a dog how to do it, and the arrangement will prevent him from scratching the paint.

Drawing Water over a Steep Bank

Hauling water over a steep bank becomes an easy task with this pivoted trough. A 5-gal. can, with the top removed and a square hole cut in the side, is mounted on one end of a trough, which is pivoted between two upright pieces at the edge the bank. There is a slight recess at the end to facilitate filling the can. The other end of the trough is fitted with a handle and is counterweighted to balance the can when filled.



Can Mounted on End of Pivoted Trough Raises Water over Steep Bank

Rolling Kitchen for Vacation Days

With vacation days at hand, boys can combine pleasure with profit by selling "hot dogs" and cold drinks along busy highways and at neighborhood affairs. The business will be made doubly interesting to the young food merchants, as well as to the patrons, by building this trim rolling kitchen, which can be towed to any favorable spot. The entire structure, mounted on six wheels, is underslung and is built as lightly as possible. If used by adults, there should be about 12 in. more height. A hot-dog kettle, heated with canned heat, is set in a tin-lined box, while a galvanized, iron-lined tank for keeping bottles cold in ice water is placed over the rear axle. Shelves, a work table and a serving counter are also provided. A vent just under the eaves is cut out, and windows with celluloid panes are fitted at each end. Entrance is made through a light door on the right side. Part of the front above the counter opens up to form an awning. The weight is carried on a V-shaped frame of 2 by 4-in. stock, with the four rear wheels, in pairs, supporting the load. Standard coaster-wheel axles are usually of $\frac{1}{2}$ -in. cold-rolled steel, but these can be made sufficiently strong by supporting them on both sides of the wheels with blocks bolted to the frame. The nuts should be on top of the bolts to make assembly easy. Give the entire job a coat of paint, and two if it is to be exposed to long periods of wet weather. Bright orange can be seen at a great distance, and is very effective when trimmed with black molding and black lettering. As this job is hung very low and has little

clearance, it is not intended for continuous towing over long distances, but only to be hauled slowly to its place of trade, preferably over concrete highways. When stationary, a wedge block is driven under each corner to keep it from rocking and to take the excessive strain off the light axles. The size of the cart may be varied but if made larger the wheels and axles should be heavier.



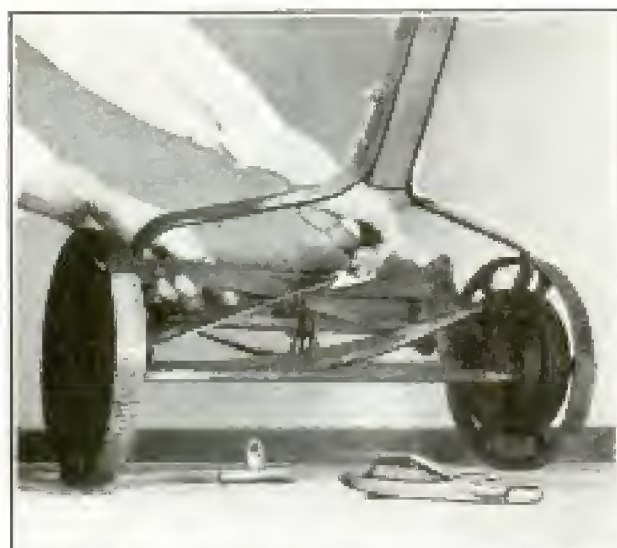
Two Wooden Sticks Hold Chisel Firmly without Danger of Injuring the Hands

Chisel Holder Improvised from Two Strips of Wood

A holder for a heavy chisel can be quickly improvised from two laths or sticks. Notch each piece to take the chisel, and wire one end of the sticks together as shown. By gripping the other end, the chisel can be held firmly.

Sharpening Lawnmower Blades

Applying the principle of a hand skate sharpener, a western home owner uses a 2-in. paper clip and a piece of a square file to sharpen his lawnmower blades. The file is inserted between the jaws, which



Section of File Held in Paper Clip Quickly Sharpens Lawnmower Blades

should project beyond the file so that they will act as a guide. A few strokes back and forth over the blade will smooth down nicks and will edge it quickly.

Yolk of Egg Removes Coffee Stains

To remove coffee stains, cover the spot with the yolk of an egg to which has been added an equal amount of carbon tetrachloride. The mixture should be well stirred before using. After the spot has soaked a few minutes, wash out the mixture with warm water and, while still moist, iron on the wrong side of the cloth.

Warning Flag Held by Mousetrap

Screwed to the rear of a trailer, an ordinary mousetrap provides a good holder for a warning flag. The spring catch or trigger is removed and the latter is twisted around the spring to afford a grip for the fingers. If a small knot is tied in the corner of the flag before placing it in the trap, it will be impossible to remove it until after the spring is lifted.



A Simple Gasoline Siphon

An easy method of siphoning gasoline from an auto tank is to lower a 4-ft. length of rubber tubing into the gasoline as far as possible. This fills all but a few inches of the tubing. Pinch the end of the hose tightly to make it air-tight and pull it out and down into a vessel, being careful that the end of the tubing in the tank remains in the gasoline. When the pressure is released on the end, the gasoline will flow into the vessel.

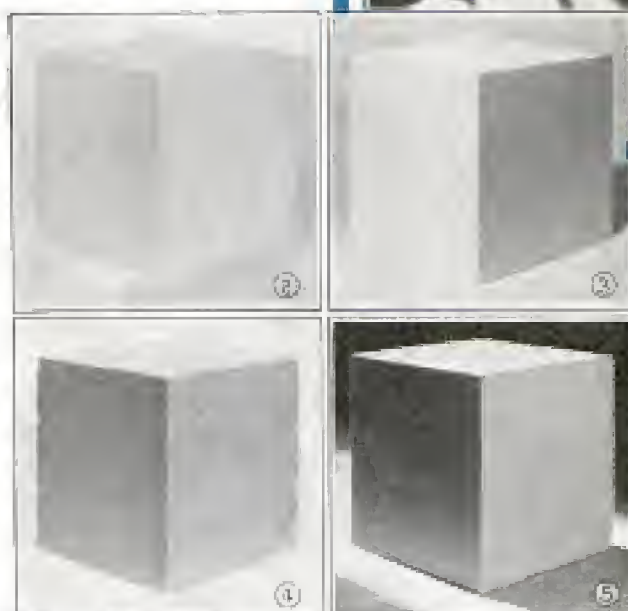
¶To prevent swelling from a bee sting, remove the stinger at once without pressing on it, as this forces out the poison.

Suggestions on making

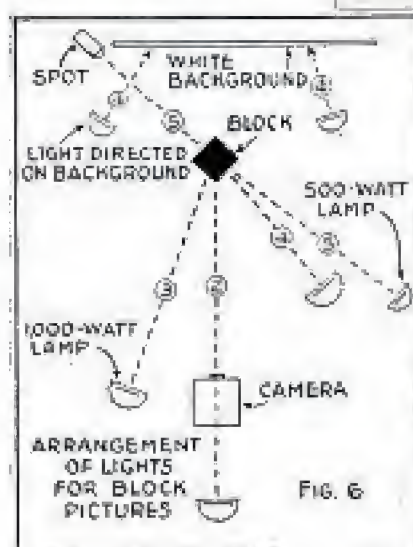
BETTER PICTURES

YOU need have neither costly equipment nor long experience to take real good photographs that have plenty of snap and action with correct shade effects.

One of the most important elements in photography is proper lighting. Consider the four photos in Figs. 2 to 5 inclusive. The same square block is shown in each picture. The camera was not moved nor the background changed, yet, through simple manipulation of light, the appearance of the block is entirely changed. Fig. 6 shows how the lights were arranged for the different exposures. From a study of this diagram and the photographs, you can readily appreciate that flat lighting should be avoided. In order to bring out the three planes of a cube, some such lighting system as shown by example No. 4 must be followed. Adding the back light,



No. 5, gives background and shadow to the picture and makes an effect that is really unusual. The large picture, Fig. 1, shows the same lighting applied to a home-workshop study. The shadow here is interesting, but it





does not detract from the important points of the photograph—the workman and the job.

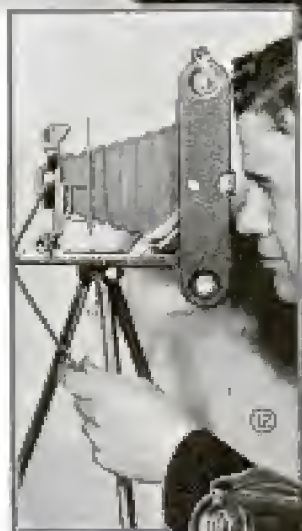
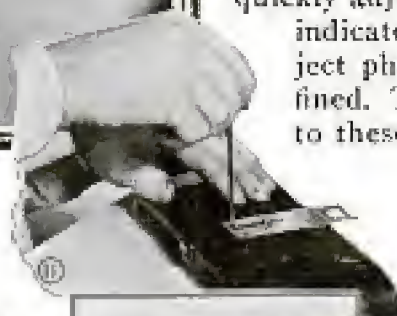
While trying to avoid a flat light, you must be careful not to overdo the thing. Strong sidelight effects, such as the example shown in Fig. 7, are worse than a flatly lighted picture, for, while the latter is flat and uninteresting, the heavily sidelighted photo positively obliterates all detail. A good example of normal lighting is shown in Fig. 8. Two light sources were used in taking this picture, the stronger one placed about 45° forward and upward from the subject, while the weaker was set in a corresponding position on the opposite side of the camera.

The proper pictures to practice on are the simple subjects. Many interesting and unusual effects can be obtained through the use of shadows alone. Studies like the simple dice-and-hand photo in Fig. 9 show what can be done, the lamps being arranged as in Fig. 10. Of course, a good arrangement of light sources is entirely lost if the picture is not properly focused. The objects photographed must be clear and sharply defined. This can be done accu-

rately by using the foot scale, which is standard equipment on most cameras, and then measuring the distance from the lens to the object. The extra reach of the bellows beyond the 6-ft. mark should be carefully checked and recorded on the scale. That is, by pulling out the bellows and checking the focus carefully, you can set down a new mark for 5 ft., and possibly one for 4 ft. If you intend to work at these distances often, a strong piece of light string, knotted at 6-in. intervals, is handy. By using this, the camera can be quickly adjusted to the proper distance as indicated by the scale, so that the object photographed will be clearly defined. The initial marking of the scale to these shorter distances can be easily done by fitting a piece of

tracing paper to the back of the camera so that it will occupy the same position as the roll film. Using this as a ground glass, you can easily check the definition for short-range work. For work which must be taken at closer quarters than the extension of the bellows allows, a portrait lens can be easily slipped into position and the proper distance checked on the scale.

Getting into the close-ups, which are often so necessary, you will run into another trouble—the difficulty of knowing when the object is properly centered on the film. Of course, you have the reflecting finder, but this is usually impractical for close work. One of the best



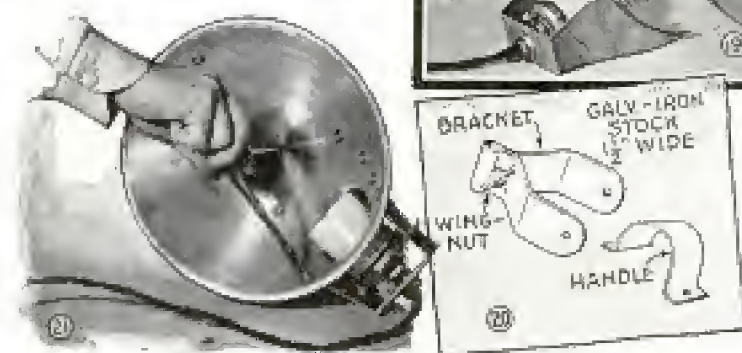
finders is the direct-vision type shown in Fig. 13. This consists of a small metal slide attached to the back of the camera, and a wire frame, which is sprung into a small tube riveted to the front upright on the left side. The openings in the slide and the wire frame are of such size that, when the camera is sighted, as in Fig. 12, the field covered will be substantially the same as that seen in the tracing-paper ground glass, which should be put on for test purposes. The wire frame at the front is usually made a little smaller than the film size; then, the necessary adjustments are made by gradually enlarging the opening in the rear finder, checking constantly in the ground glass. Once the proper ratio has been determined, the metal case can be securely fitted to the back of the camera with No. 0-60 screws, as shown in Fig. 11. The case is simply a flat strip with the edges turned over. Two or three thicknesses of paper under the case edges are necessary in order to afford sufficient clearance to allow the slide to be freely pulled in and out.

A practical light for the taking of inside shots is shown in Figs. 15 and 16. Notice that the stand is an old automobile steer-



a section of galvanized sheet iron, shaped as shown in Fig. 17, and a mogul socket, as shown in Fig. 18. A study of the photographs and sketches should make it apparent just how the thing works.

The inner column of the steering-wheel post is turned over at right angles to take the bracket clip shown in Fig. 20. The various pieces are assembled with small bolts in preference to rivets, so that a new pan can easily be substituted if the original develops light defects caused by a scratched



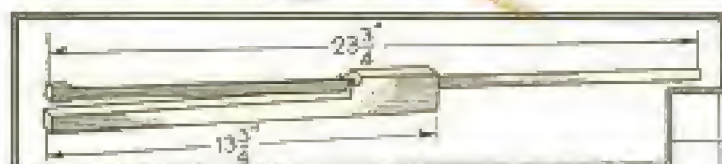
ing wheel and column. This should be selected with an eye to the telescopic possibilities. Almost all columns contain two or three tubes which, when extended and held fast by means of setscrews, allow an extension up to 10 or 12 ft. The reflector is an aluminum dishpan, about 10 in. in diameter. This is used in connection with

or dented surface. As to the actual light to use, this is a matter of judgment with an eye on the pocketbook; 1,000-watt nitrogen lamps are probably the most desirable for all-around work, but any bulb from 200 watts up in sunlight, incandescent or daylight lamps can be used successfully.

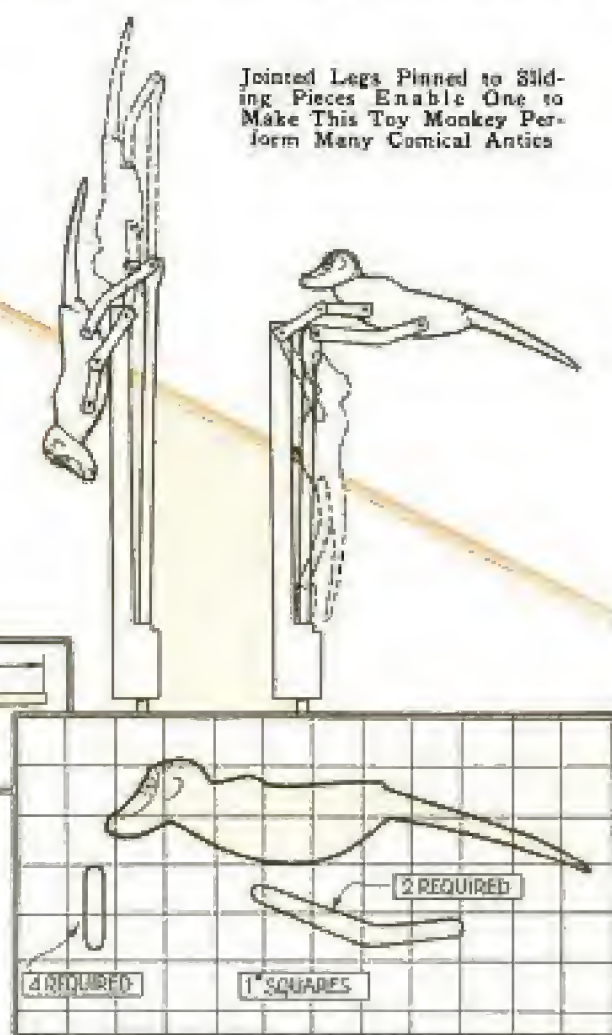
It's Amusing to See This Climbing Monkey



Jointed Legs Pinned to Sliding Pieces Enable One to Make This Toy Monkey Perform Many Comical Antics



Performing all sorts of antics in climbing up and over the stick, this jointed monkey makes an amusing toy. It consists of a few pieces of wood, available almost anywhere, and the parts can be scroll-sawed or simply whittled to shape. All you need is a round stick on which a shorter piece slides, one end of the latter being drilled lengthwise to form a sleeve. Other parts required are four pieces cut to form legs, and one piece for the body of the monkey, the front legs being pivoted at the knees and all the legs pinned loosely to the body to permit the joints to work freely. The front legs are similarly pinned to the end of the long round stick, which is squared at the end where the



legs are attached, while the hind legs are pinned to the end of the sliding piece. In use, vertical movement of the latter causes the monkey to assume a variety of positions to make a flying jump over the end and down, head first, on the other side, or it may hesitate and stand on its head on the end of the stick.—Joe Turner, Davenport, Va.

Extension Box Enables Taking of Close-Ups and Copying

Large photos of small objects are often wanted, and require a long bellows on the camera. For a plate camera of only moderate extension, having a removable lens board, a box can be made for extending either the lens or the back of the camera to hold the films or plates. The front end of the box need not be fitted for the lens,

as the board can be clamped temporarily to it with some light-proof cloth. It should be tight and should be painted dull black on the inside. For cameras not fitted with a removable lens board, the box is made to fit the back, or to clamp to the back tightly in order to exclude light. In this case, the plate holder is held on the back of the box. If the length of the box is approximately equal to the focal length of the lens used, pictures of small articles

can be made full size, using the lens two focal lengths or about twice the normal distance from the focal-plane plate or ground glass. With cameras having adjustment of the lens all the way from the back to the normal lens position, objects can be focused from a distance equal to twice the focal length of the lens, as well as all intermediate distances up the infinity. For double normal extension, the exposure should be four times as long as the time for the same stop opening when used at infinity, which is marked 100 ft. on most cameras. For one and one-half times normal extension, expose only twice as long as for infinity. Other extensions between those given can be figured in proportion, remembering that the exposure should be inversely proportional to the square of the distance of the lens from the plate. Care must be taken that the box does not cut off the light from any part of the plate. This is especially likely to happen where the extension is made at the front, and can be checked by opening the shutter, with the back off the camera, and sighting from the edges of the space which the holder would occupy. If the whole lens can be seen from all parts of this space, no light will be cut off. A very small stop should be used with a long-time exposure to obtain depth of focus and also to minimize any error made in focusing.

Attractive Sign from Windmill Vane



An old windmill vane was utilized to makethis sign. For a base a small trench was dug in the ground and filled with concrete. The vane was set in the concrete while the latter was still soft.

☞The appearance of wire on model work can be improved if it is flattened with a sheet-metal roller.



Old Oil Drums, Cut in Half and Filled with Water, Keep Milk Cans Cool

Oil Drums for Milk-Cooling Tanks

Milk or cream cans set along the highway can be kept cool by placing them in old oil drums, cut in half and filled with cold water. During winter, the drums can also be used, filling in the space between the milk cans and the drums with paper to retain the heat and prevent freezing.

Paper Makes Camp Bed Warmer

Layers of newspapers placed between the blankets and the camp bed will make it possible to keep warm with less bedding. This is especially true if the bed is made on the ground. As paper is a better insulator than cloth it is effective in preventing the passage of cold or damp air, while the blankets retain the heat from the body. The use of the papers will enable you to reduce the bulk of your camp equipment somewhat.—H. E. Benson, Denver, Colo.

Watertight unit developed
by Westinghouse Electric Mfg Co
East Pittsburgh Pa

Gardens that

illumination of
fountains, cascades, swimming
pools



By
Charles W. Person

TOUCHES of soft colors, mysterious shadows, here and there a statue group, made doubly beautiful by the charm of exaggerated distances, small ensembles of trees appearing like individual pictures on canvas—these are some of the effects brought to life by the wand of

electric illumination. Although floodlighting is a well-developed art, it has had a limited measure of success in the field of garden lighting. Monotonous spreads of light are not pleasing to the eye for long intervals, as the contrasts are lost and particular spots of beauty are merged with the more commonplace ones. Indirect lighting has many possibilities for bringing out details in sharp relief. Even so simple a thing as a small reflector, partly buried in the earth, may do wonders at night when played upon foliage. It can be so placed that the light will strike the leaf clusters in a tree above and will then be reflected downward to simulate moonlight over a pathway beneath. Vines and shrubs growing on a garden wall or a light-colored fence may be brought out strongly and near-by areas dimly lighted by reflection. If foliage intervenes between the light source and the light-colored background, interesting shadows and silhouettes will be obtained. Light sources placed beneath the water of small foun-

Bloom in the Night



tains and lily pools, with the illumination projected across the bottom or pointed upward to catch the spray of the fountain, may create rare beauty. Shrubbery around the border of a large pool or pond can be brightly lighted by sources concealed on the opposite bank, resulting in silver reflections in the black mirror of the water's surface.

Small garden statues and fountains offer fine opportunities for beautiful and spectacular effects. In spotlighting a statue, care should be taken lest the shadows be grotesque, and that the narrow-beam projector will not shine into the windows of neighbors. The use of colored lights under the spray of a fountain is a favorite way to create a rainbow at night. Or a small source of light, placed close to the base of the jet of water, will turn it into a stream of molten silver. For those who do not enjoy the luxury of a garden



fountain, a simple but no less effective substitute may be employed by attaching small projectors to portable lawn sprinklers or sprays, the current being carried by means of a flexible waterproof conductor fixed to the hose. In this manner,



the sprinkler may be converted into a luminous fountain. Arches, pergolas and tea or summer houses offer other opportunities for glorification at night. Incandescent lamps are available in many convenient sizes, while color screens may be had in the form of pressed-glass lenses, colored sheet glass cut in strips, or gelatin-impregnated screen wire. Beautiful effects are also obtainable by interlacing green or purple Christmas-tree lamps on weatherproof strings among climbing rose or wistaria vines.

According to experiments made by lighting specialists, red or amber colors should not be thrown on green foliage. A pure-green color screen does not bring out the foliage as well as a screen that is low in yellow, but has a considerable percentage of blue. One of the best color media for garden lighting is "signal-green" or green-blue sheet glass, double thickness. If this glass is used as a lens in positions exposed to rain or sudden temperature changes, or if it is to be used in disks larger than 10 in., it should be split or cut into strips to permit expansion and contraction without breakage. In the illumination of flowerbeds, the best effects can be obtained by combining a green-blue color of glass with a tinted light matching closely the predominating hue of the flowers. An impression of distance and depth is created best by blues and purples. A white column or statuary may have an interesting

appeal if illuminated in cerise from one side and light blue from the opposite side, thus producing a graded purple where the colors blend. Contrary to popular opinion, orange and yellow lights do not attract common insects, while bluish light sources do. In a beetle trap, much like a small bird cage, a 40-watt blue lamp serves the dual purpose of trapping insects and providing moonlight effects.

For the average small garden or lawn shrubbery, electric consumption need not exceed 250 watts. This permits the lighting of a clump of trees, a rose arbor and one or two additional spots. On private estates, the swimming pool lends itself particularly to the use of light. Such areas are usually surrounded with separate landscaping designs, which, if illuminated at night, not only add to the beauty of the pool but provide also a utility illumination for swimming. Pools can be illuminated with waterproof lamps placed under the water, and vapor-proof lamps are used in places exposed to much moisture.

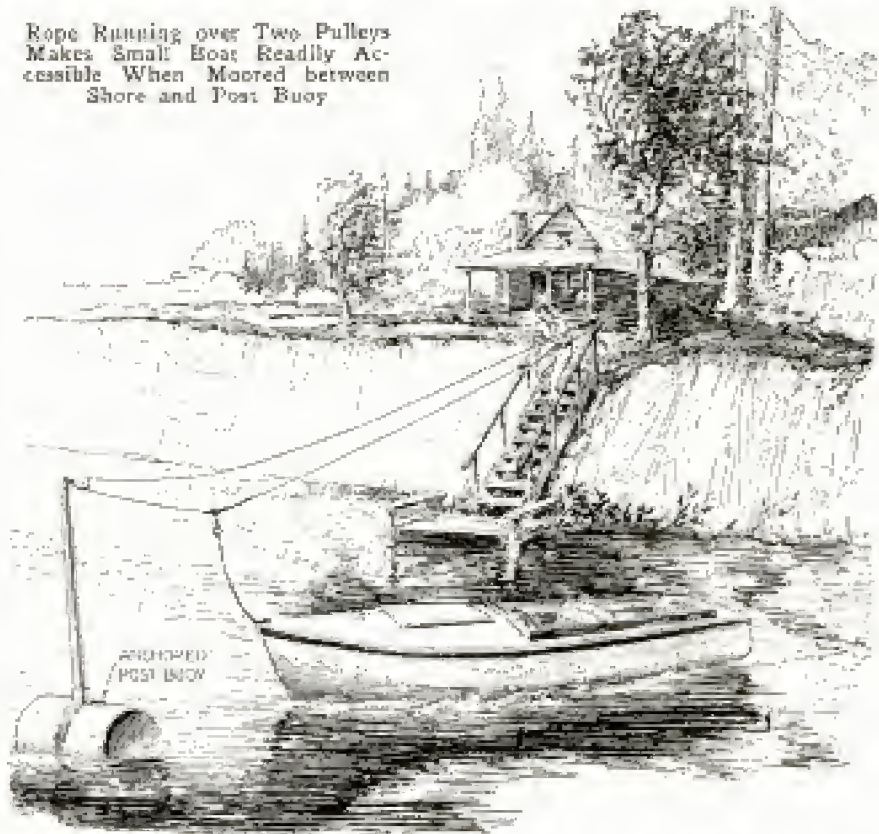
Hot Iron Separates Sticky Stamps

The next time you find postage stamps stuck together so that they cannot be separated by ordinary means, try placing them under a sheet of paper and pressing it with a hot iron. This removes the excess moisture so that the stamps can be taken apart.

Mooring a Small Boat Safely off Steep Bank

In order to avoid damage to your boat caused by battering against a dock or against a steep, rocky bank, try the illustrated method of tying it to a line which runs from the shore to an anchored post buoy. The line, a heavy sashcord, should be double the distance so that it can be slipped through two pulleys, one attached to the post on the buoy and the other to a post on the dock. With this arrangement you can pull the boat out until it is halfway between the buoy and the bank, or pull it in when needed. The rope is, of course, tied at the land post. A snap hook fastened on the mooring line makes quick attachment to a ring on a chain attached to the bow of the boat. An old oil drum makes an excellent buoy, the

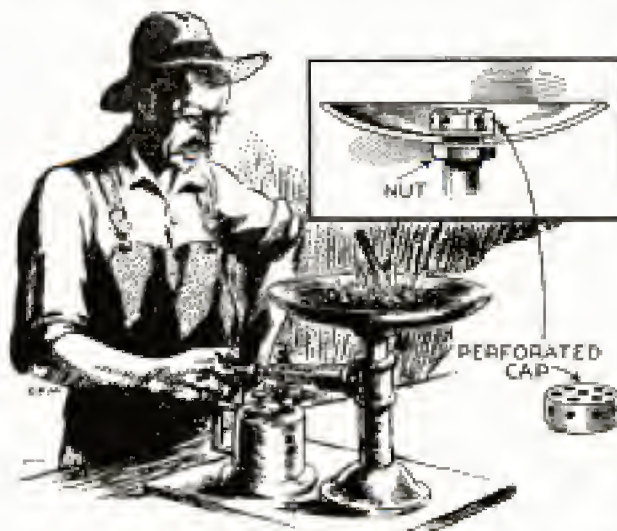
Rope Running over Two Pulleys Makes Small Boat Readily Accessible When Moored between Shore and Post Buoy



post being attached to a socket welded to an iron band, which is clamped around the center of the drum.

Blowtorch Operates Small Forge

This small forge consists of a harrow disk, pipe nipples and fittings, and a blowtorch. A floor flange is first screwed to a wooden base, and two pipe nipples and a



Old Harrow Disk Forms Fire Pan of Homemade Forge Made Up of Old Pipe Fittings

tee are assembled as shown, so that the mouth of the blowtorch can be inserted into the side opening of the tee. A nut is then driven on the threaded end of the upper nipple, whereupon the disk, which is reamed out to fit over the pipe, is slipped on and held firmly with a perforated pipe cap. To retain as much heat as possible in the fire pan, it should be covered on the inside with a layer of fire clay. It is also a good idea to fill the flange and the lower nipple with sand to prevent lighted coals from sifting down and burning the wooden base.

Nails Tighten Chair Legs and Rungs

Driven into the edge of the seat and through the leg, finishing nails will spread the end of the leg and tighten wobbly chairs. If the rungs are loose, they can be tightened in the same way, driving the nails through the legs and into the end of the rungs.

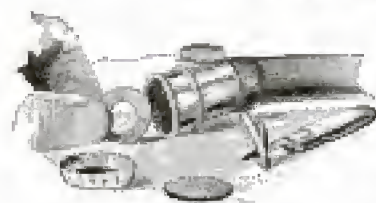


Caddy's Wheeled Cart for Holding Golf Clubs Is Easily Pushed or Pulled Along

Golf-Club Cart Lightens Work of Caddies

Caddies can lighten the work of carrying heavy golf bags by mounting them on a two-wheeled cart, which consists of a light frame attached to the front axle and wheels of a discarded baby carriage or cart. A small drawer provides ample space for balls, while strap-iron feet enable the user to set the cart vertically so that the clubs are readily available. The bag is strapped to the frame of the cart as indicated, and curved handles are provided on the ends of the frame for use in pushing the cart.

Hose Washers Cut from Cork Lining in Bottle Caps



Water-tight washers for garden-hose connections can easily be made from the cork lining in bottle caps. The cork is removed from the cap, and the center cut out as shown. Two of these washers will be about the correct thickness to seal a connection.

Water-tight washers for garden-hose connections can easily be made from the cork lining in

Replacing Moisture in Dry Popcorn

Have you ever had corn that popped well sometimes but not at other times? If so, here's a tip that will help make it pop uniformly. Pour the corn into a pan of water and let it soak for a few minutes. After draining off the water, you will find that the corn has absorbed enough of it to generate steam quickly, which causes the kernels to burst when heated. On the other hand, too much moisture also prevents successful popping, and it is then necessary to remove the excess moisture by aging the corn, which is done by letting it stand in a dry place.

How to Prolong Life of Minnows Used for Bait

Minnows taken from shallow streams, or those that are kept in surface water, usually die soon when suddenly plunged into cold water. Therefore, when fishing deep, it is a good idea to first play the hook near the surface, gradually letting it down into the deeper water. In this way, the minnow will be exposed slowly to the colder temperature and its life prolonged.

Metal Heel Plate Protects Screen Door

Screen-door hooks often mar the wood and paint, wearing a small groove in the door frame, unless some means of protection is provided. An ordinary metal heel plate, fastened to the frame where the end of the hook strikes, as shown in the photo, will prevent this.



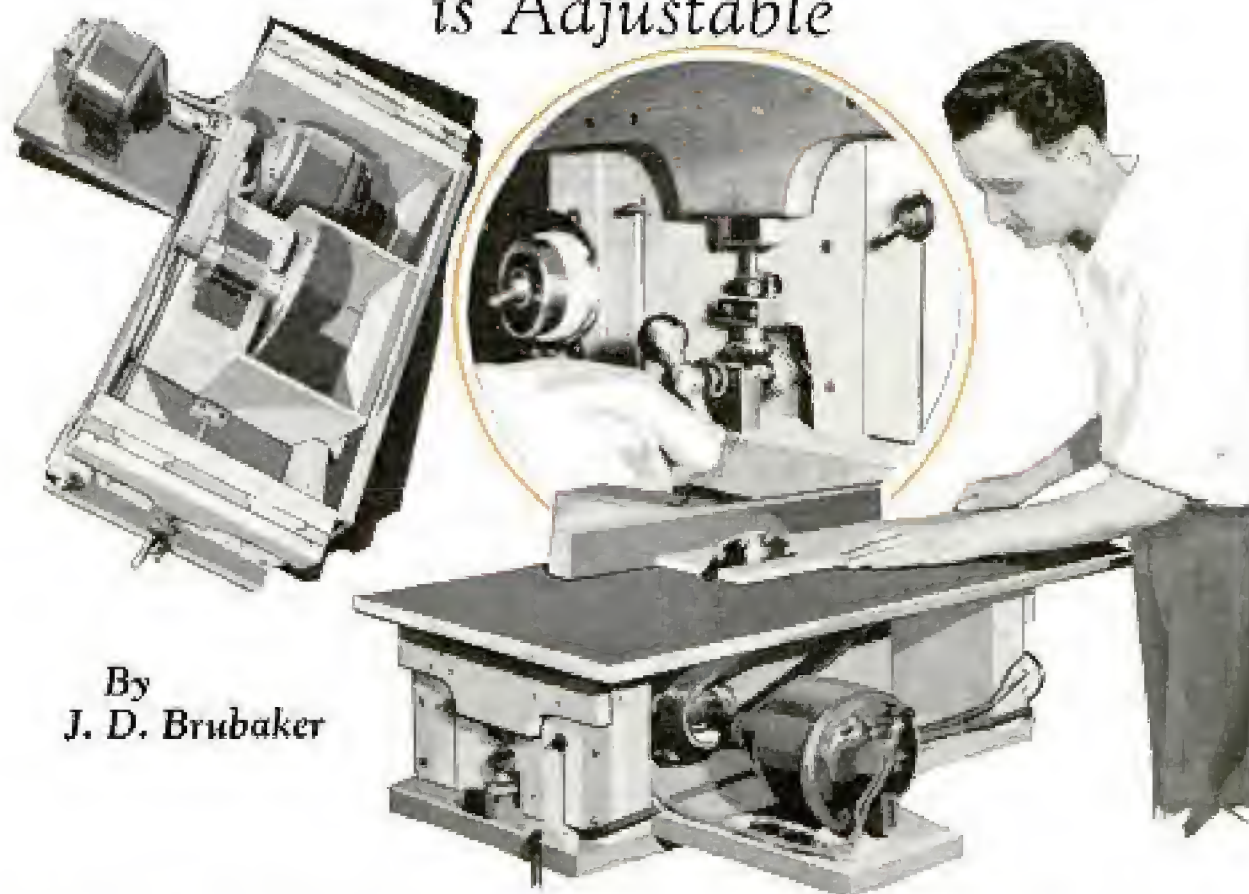
Fertilizer for Potted Plants

Potted plants can be invigorated by sprinkling them after sundown with a teaspoonful of the following fertilizer dissolved in 1 gal. of water. The ingredients are 1 lb. of ammonium sulphate, $\frac{1}{2}$ lb. of potassium nitrate and $\frac{1}{4}$ lb. of sugar. Sprinkling should be done two or three times a week.

SHOP NOTES



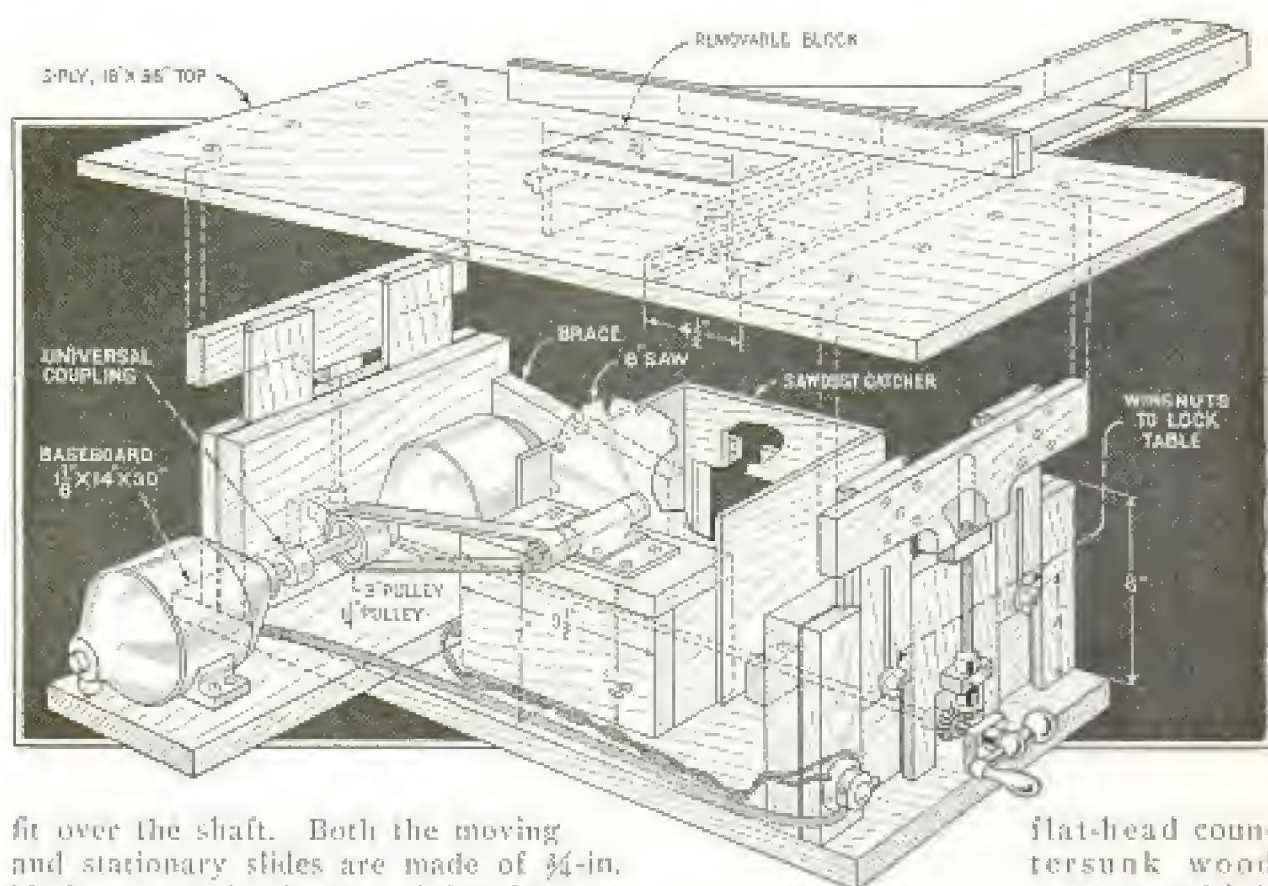
Homemade SAW TABLE *is Adjustable*



By
J. D. Brubaker

CARRIED on vertical slides, this saw table can be raised or lowered by means of two threaded rods geared to a common horizontal shaft, fitted with a ball-crank handle. After adjustment, the four slides are locked with wingnuts. Another good feature is the telescoping box to catch sawdust. A sheet-metal piece deflects the sawdust through an opening at the side over which a bag can be tied to collect it. The two motors, connected with a universal joint to obtain additional power, are peculiar to this particular installation, as only one motor of sufficient size is really needed. Usually a $\frac{1}{4}$ -hp. motor will

run an 8-in. saw adequately. The base and vertical pieces should be free from warping or twist as this would cause the slides to jam, and therefore the base should preferably be a piece of $\frac{3}{4}$ or 1-in. plywood. The box, which supports the saw arbor, is made up from $1\frac{1}{8}$ -in. white pine, its exact height depending on the saw arbor used. The center of an 8-in. saw should be 7 in. above the base. The two pieces of plywood forming the ends of the sawdust compartment are 8 in. high. They should be put in place after the elevating driveshaft has been installed. Notches are cut in their bottom edges to



fit over the shaft. Both the moving and stationary slides are made of $\frac{3}{4}$ -in. birch, or any other hardwood that does not swell much when damp. For clamping, use is made of $\frac{1}{4}$ by $2\frac{1}{2}$ -in. carriage bolts, with wingnuts and washers. The cross-piece at the top of each pair of movable slides should be carefully screwed to insure a rigid joint.

The shaft-bearing blocks, the vertical shaft-thrust blocks and the traveler blocks are of $\frac{1}{2}$ -in. brass, cut accurately to insure true alignment. The three thrust collars are of either steel or cast iron. If the latter kind are used, they should be setscrewed to a rod held in a chuck, and one face turned square with the hole. Miter gears are setscrewed to the horizontal and vertical shafts. Both driving gears are on the far side of the driven ones to make the table rise when the crank is rotated to the right. The two vertical threaded shafts should be adjusted so that the travel is 3 in. before the threaded traveler block runs off the end of the shaft. The best way is to get the whole elevating system working perfectly before screwing on the top.

The table top is made of a piece of five-ply veneer. The rectangular hole is cut so that its left side (on the center line of the top) will be next to the saw. The saw slot is cut by lowering the table onto the saw. The removable block is held with two

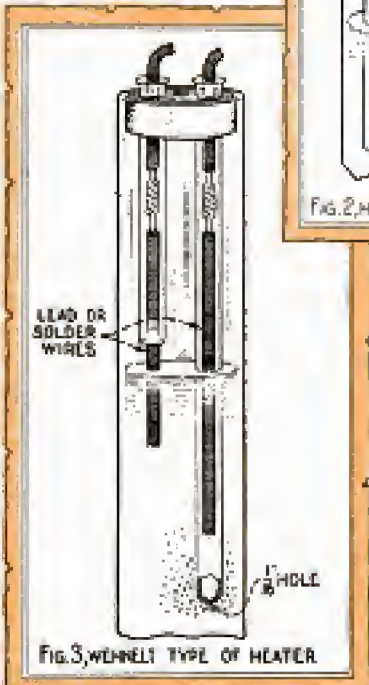
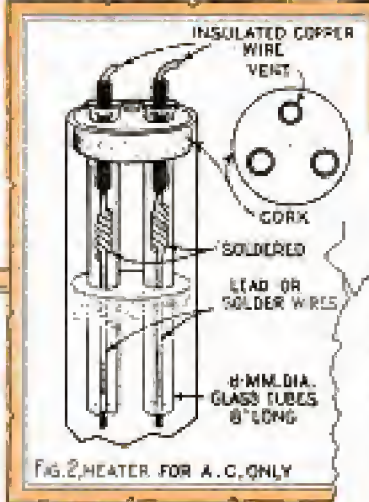
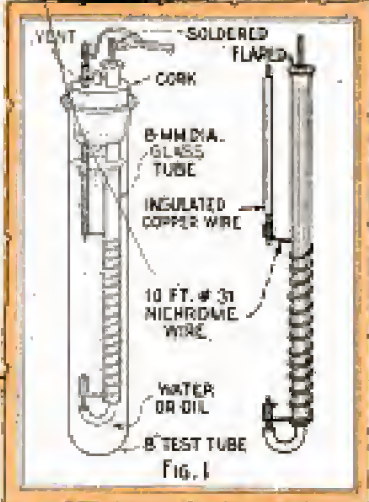
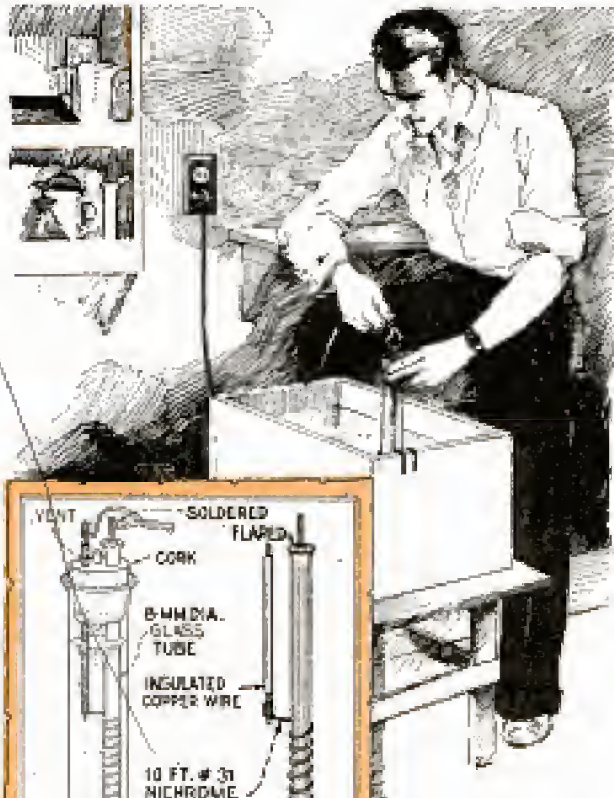
flat-head countersunk wood screws, which fasten into the pieces carrying the movable portion of the sawdust catcher. The ripping fence is made of hardwood, the piece below the table top running in slides similar to the vertical ones. The motor is raised from the base on two blocks to clear the horizontal shaft. The saw arbor was made by fitting two sleeves on the ends of a piece of pipe. A ball bearing was pressed into each end, and the arbor made so as to go in with a light drive fit. Two pieces of $\frac{1}{8}$ by 1-in. strap iron were welded to the pipe to form the base for mounting the arbor. The top should overhang at the front to prevent accidental throwing of the switch, as well as for protection against damage from any heavy lumber which might fall on it.

Homemade Hand Soap for Mechanics

Rub 2 dr. of corn starch to a paste with 3 oz. of glycerine. Heat this mixture slowly until it assumes a jellylike consistency. Then add 8 oz. of powdered castile soap and 2 oz. of pumicestone while stirring over heat. If the mixture is too thick for use, add glycerine or water until a suitable consistency is obtained. The soap may be perfumed with desirable essences.

Small Immersion Heaters for the Laboratory

These electric immersion heaters, designed to run on 110-volt current, are both practical and inexpensive. Fig. 1 shows the wire-resistance type inclosed in an 8-in. test tube. It is fitted with a rubber stopper having three holes, one to receive an 8-mm. glass tube, one a short piece of insulated copper wire, and the third a small vent tube. Flare one end of the first tube so that it will be easy to slide in a length of insulated copper wire. The wire is bared at the end projecting out of the bottom of the tube, and is connected to the heating element, which is wrapped around the lower portion of the tube. The other end of the element connects to the piece of wire projecting from the second hole in the stopper. Fill the tube with water or oil, preferably the latter, to serve as a conducting medium to the side of the test tube, which in turn transfers the heat to the liquid in which it is immersed. This heater can be used either for direct or alternating current, whereas the one shown in Fig. 2 is for alternating current only. The stopper has three holes, and two glass tubes containing lead or solder electrodes



are used, which project below the tubes at their lower extremity and are connected to insulated copper wires at the top. The test tube is filled to the height indi-

cated with a very weak solution of sulphuric acid, the proper strength of which is determined by first using water only, then adding the acid drop by drop until proper heating is obtained. Fig. 3 shows another heater for use on direct current, a variation of the one just described. It consists of one long and one short glass tube, both inclosing a lead or solder-wire electrode. The longer tube is nearly closed at one end by fusing the glass over a Bunsen burner. The hole should be no more than $\frac{1}{8}$ in. in diameter. The wire inclosed is connected to the positive side of the supply line. As in the second type, a dilute solution of sulphuric acid is used. The small hole serves as a high-resistance path for the current and the electrolyte there boils quickly. The heaters can be hung in a solution by means of a wire holder. To control the heat, a rheostat is cut in one of the supply leads.—J. G. Zimmerman, Madison, Wis.

Charles H. Bealy, 118 N. Clinton Chicago

Copper wire { Martin Electric Co.
 625 W. Van Buren Chicago

Sheet-Metal Tank Incinerator on Wheels

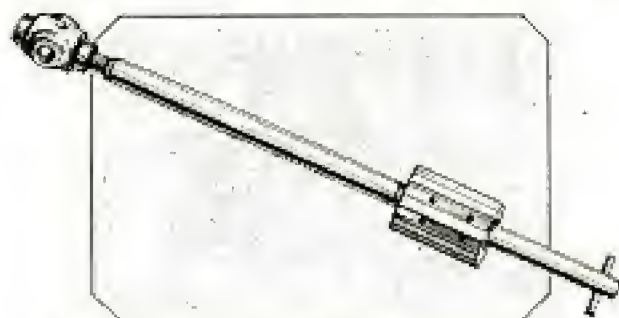


Old Sheet-Metal Tank, Fitted with Casters and a Sliding Ash Pan, Forms This Wheeled Incinerator

Made from an old tank, this wheeled incinerator is handy in disposing of waste material, especially around shops and factories. A section from the ends of the tank is cut out near the bottom, as indicated and a sliding sheet-metal pan installed to allow easy removal of ashes. The pan projects a few inches at each end to provide space for entrance of air. The legs of the tank are fitted with large casters.—Arthur Kendall, Hamilton, Ont.

Tool to Remove Auto Driveshafts

In order to remove the driveshaft of a Chevrolet or Pontiac car, the tool illustrated here has saved me hours of labor. I procured a discarded axle and, after drilling a $\frac{1}{2}$ -in. hole about 1 in. from the key end, drove a 4-in. pin into the hole and peened the ends so it could not come out. A large piece of iron, with a hole of sufficient diameter to enable it to slide freely



Driveshaft Remover Made from Discarded Axle

over the entire length of the shaft, was then slipped on to act as a weight. To complete the tool a wheel puller with the proper thread for the axle on one side and the correct thread for the driveshaft that is to be removed, on the other side, is screwed on tightly. In use, the differential cover and the ring and pinion gears are removed, the tool is screwed on the driveshaft, and this is quickly removed by sliding the weight back and forth on the bar. A large double nut properly threaded on both sides may be used instead of the wheel puller, but as most shops have two or three old wheel pullers lying around, the necessity of making a special nut is usually unnecessary.—Lucius W. Lamar, Bellerose, N. Y.

Shoehorn Used as Chemist's Scoop

Chemists and others who often weigh out powders in small quantities will find an ordinary shoehorn much handier for this purpose than a spoon. The size, shape and weight of the horn enable it to hold quite a bit of powder, and allow the user to remove it gently by tapping the underside or edge with his finger. Also, it can be hung on a nail when not in use.



Fire-Safe Insect and Bug Destroyer

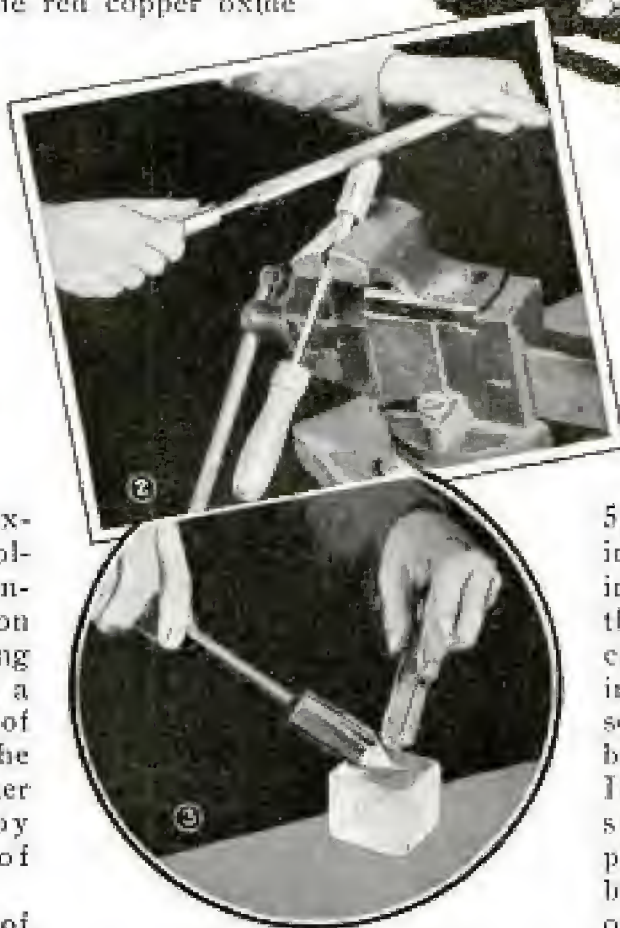
One ounce of rosin and 1 oz. of oil of amber, dissolved in a mixture consisting of $\frac{1}{2}$ gal. of gasoline and $\frac{1}{4}$ gal. of carbon tetrachloride, makes an effective and non-inflammable insect and bug destroyer. It may be used in a spray gun to kill flies, bedbugs, fleas, ants, roaches and other pests. The rosin forms a cake around eggs and thus prevents hatching. It is not necessary that the destroyer be aimed at the pest to do its work. Finely divided particles of it in the air that the insects breathe will kill them.

The Tricks of SOLDERING

by
C.A. Crowley

BEFORE attempting to use any soldering iron, you should first dress its faces by filing them smooth, as in Fig. 2, so that they are free from dirt and scale. The cleaned iron may be heated over a gas hotplate, smokeless incandescent burning coals or with a blowtorch. A tinner tests the temperature of his iron by holding the bit about 6 in. from his face. An iron which is hot enough will make its heat felt at this distance and solder touched to its clean face will be instantly melted as in Fig. 1. When the dressed iron has been heated, some red copper oxide will be formed upon its faces. Before the iron that is coated with solder can be tinned, the oxide must be removed either mechanically or by the use of suitable fluxes. The best method of tinning an iron is to rub the faces on a block of sal ammoniac, as in Fig. 3, which removes the oxide, and if a bar of solder is brought in contact with the hot iron while its faces are being rubbed on the block, a bright, adherent coat of solder will cover the faces. Surplus solder may be removed by wiping on a piece of cloth.

If a large amount of soldering is being done, two or three well tinned irons should be kept heating, as extra irons make it possible to work continuously. When tinned soldering irons are heated, a small portion of their surface tin becomes oxidized and loses its bright color. A pint jar half



filled with water, in which is dissolved a few scraps of sal ammoniac, is effective for removing this. Plunge the tip of the iron into the solution, as in Fig. 5, and quickly remove it immediately after heating. This will bring back the original luster. Zinc chloride, made by "killing" muriatic acid with scraps of zinc, can also be used for this purpose. It is also suitable for soldering copper, tin plate, iron, steel and brass, and is about the only flux that will give good results on steel.

To make cut acid or zinc-chloride flux, dilute some commercial muriatic acid with an equal quantity of water in a large-mouthed glass vessel, pouring the acid drop by drop into the water, and add a few small pieces of scrap zinc, which may

Before the Work Can
Be Soldered It Must Be
Thoroughly Cleaned

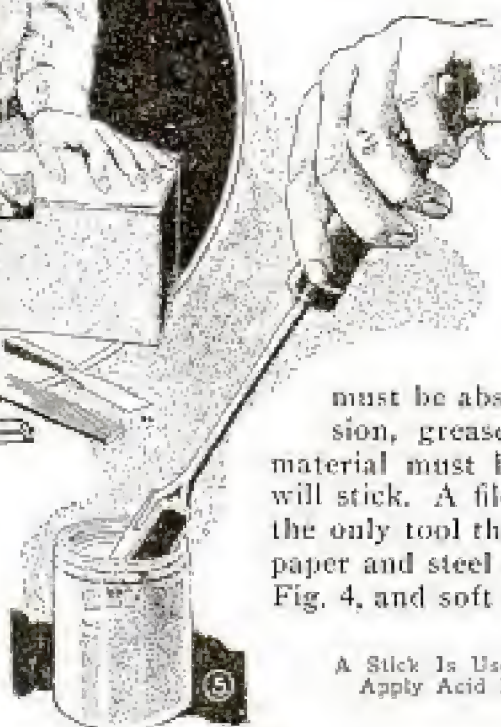


be obtained from old dry cells. After the "boiling" has slackened, add more zinc and continue adding zinc until the solution no longer gives off bubbles of gas. This should be done in a well-ventilated room and away from open flames. The gas is inflammable hydrogen and carries with it small quantities of corrosive acid. The zinc-chloride solution is applied with a rubber brush, or swab, made from a piece of old inner tube. It is excellent for most repair jobs and for general soldering, but should not be used on electrical connections as it is corrosive. Electrical soldering requires either a non-corrosive paste or a specially prepared liquid flux. A good inexpensive paste is made by rubbing together equal parts, by volume, of zinc-chloride crystals and vaseline. A good non-corrosive liquid flux is made by adding as many zinc-chloride crystals to water as can be dissolved. To five parts of this solution add four parts of denatured alcohol and one part of glycerine. Shake the mixture thoroughly, and it is ready for use. For sol-

dering zinc and galvanized iron a flux consisting of ordinary muriatic acid, to which has been added an equal volume of water, should be used. This flux should not be employed on any other work. Rosin, being a part of so-called self-fluxing solders (rosin-core wire solder) may be used with almost any metal. Powdered rosin, sprinkled over the cleaned work, will remove the last trace of oxide and allow the solder to stick tight to practically all metals except aluminum. Aluminum cannot be sol-

dered by ordinary methods. There are numerous special solders on the market which are recommended for aluminum. In using these solders, the directions furnished by the manufacturers must be rigidly followed, if good results are to be expected.

Work to be soldered, must be absolutely clean. Any corrosion, grease, rust, or other foreign material must be removed before solder will stick. A file or grinder is sometimes the only tool that will remove it. Emery paper and steel wool are often used, as in Fig. 4, and soft metals may be cleaned by

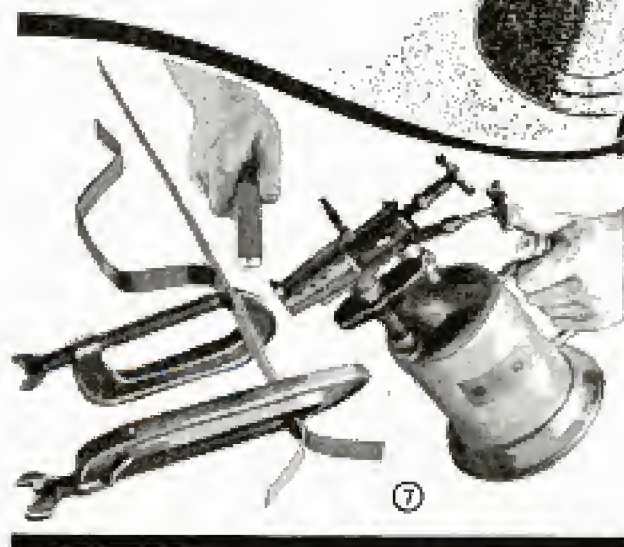


A Stick Is Useful to
Apply Acid Flux



scraping with a knife. When the work is clean, apply a small amount of flux to the surfaces to be joined, Fig. 6. Remove the iron from the fire, test its temperature, quickly dip it into zinc-chloride flux or a bottle of sal-ammoniac cleaner, and touch it to a bar of solder. If the iron is clean

and well tinned, it will pick up a quantity of solder. The iron carrying its charge of solder should then be applied to the joint. Place the iron on the joint and hold one of its faces in close contact with the work, until the latter has become hot enough for the solder to flow onto its surface. This will require only a few seconds, and no rubbing of the iron over the work will be necessary. When the solder starts to flow, the iron should be slowly moved along the seam, allowing the solder to flow into the joint. Another method is to touch the bar of solder to the face of the iron while it is being slowly moved along the seam, thus feeding the solder to the iron as it is used. When a soldering job has been completed, the surplus acid flux should be removed from the joint, to prevent corrosion. Should the iron be overheated, its coating of tin will be burned and will present a white, flaky appearance, and dipping in the cleaning solution will not bring back the bright color. If not too badly burned, the iron may frequently be retinned by scouring on a brick or sal-ammoniac block and applying



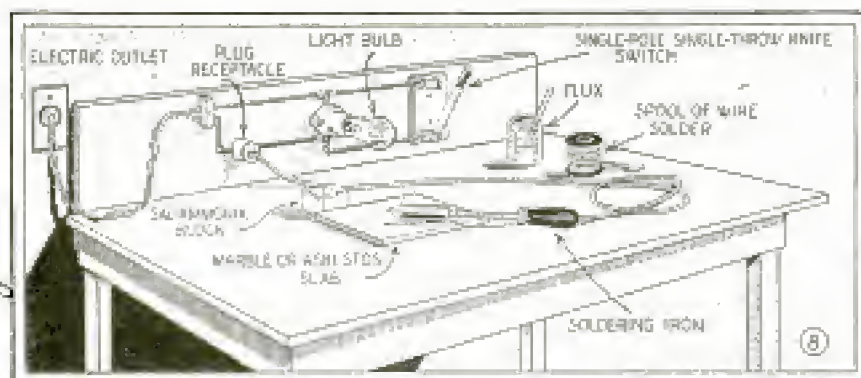
flux and solder, but if it has been badly overheated, it will be necessary to refile the faces and retin. Too much flux may rob the iron of its heat and actually make soldering impossible. To solder a large sheet-metal job, a heavy soldering copper must be used, as a small iron will not impart

sufficient heat to raise the temperature of large objects to the melting point of solder.

Lead, pewter and white-metal alloys, having a low melting point, can be readily united if a special solder is used for the job. A good solder for pewter may be made by melting ordinary tinner's "half-and-half" solder, consisting of equal parts of tin and lead, and adding to this three parts of bismuth. The solder and the bismuth should be melted in an iron pot and stirred until the whole is completely melted. This solder will melt at about 240° F. The best flux for such metals is tallow.

Electric soldering may be done in exactly the same manner as with the ordinary stove-heated irons. A large heavy-duty iron, as described in the June, 1932, issue of Popular Mechanics, can be used for heavy work. With an electric iron, the most frequent trouble results from allowing it to be overheated. If a circuit, such as is shown in Fig. 8, is rigged up at the workbench, an electric iron may be left on continuously without overheating. The lamp in series with the electric iron should be of such size that the iron will come to a temperature sufficiently high to melt solder. When the iron is not in use, the

100 watt lamp in series
with soldering iron

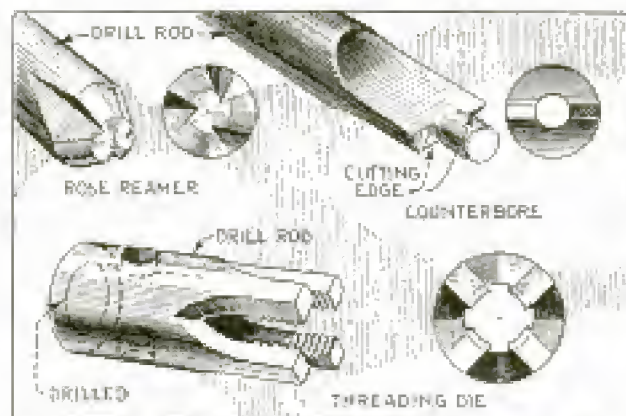


switch should be left open, but when actually soldering, it should be closed to short out the series lamp and allow the iron to do its maximum in heating. Electric irons used in this manner may be safely left on all day without being burned or having the tin discolored.

If a large number of objects are to be coated with solder, either as a protection against rust or so that they may be more easily soldered together, it is a good plan to tin them by dipping in a ladle of molten solder. Throw enough rosin into the pot of melted solder to cover the surface and immerse the cleaned articles. The solder will completely coat the surface and the articles may then be securely joined by clamping them in place and heating until the solder flows, as in Fig. 7. This method is known as "sweating."

Cutting Tools Made of Drill Rod

Several cutting tools that can be made from drill rod for emergency use are shown in the drawing. The rose reamer, having three flutes equally spaced on the beveled end, is made by cutting out the lips with a file. In making the counter-bore, the end of the rod is first turned



Emergency Cutting Tools for Use on Odd-Size Work
Improved from Lengths of Drill Rod

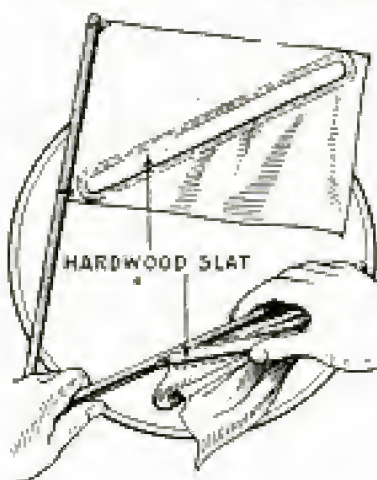
down to make the pilot and then milled to form the cutting lips, while edges are provided by backing them off with a file. The threading die is made by drilling the end of the rod with a tap drill, while the sides are opened, to provide cutting faces, with the edge of a mill or beveled cutter.

If necessary, the opposite end of the die may be drilled out to provide clearance for the work. It is necessary, of course, to harden these tools before using them.

Warning Flag Stiffened with Slat

Warning flags, used in road-construction work, can be kept unfurled by means

of a narrow hard wood slat, fastened diagonally across the flag as shown. A strip of red cloth, sewed to the flag, forms a pocket for the slat. The weight of the slat keeps the cloth extended, and when the flag is to be put away, it is a simple matter either to remove the slat or fold it upward against the stick as in the lower detail.—A. T. Lawton, Ottawa, Canada.

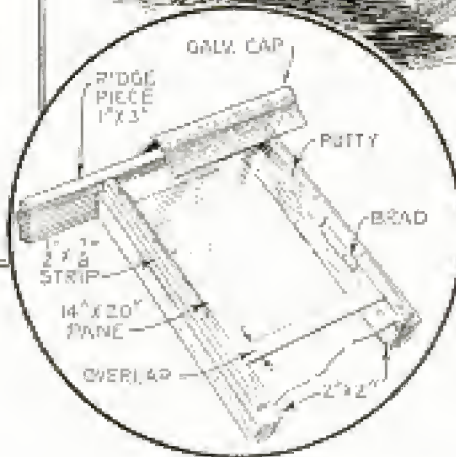
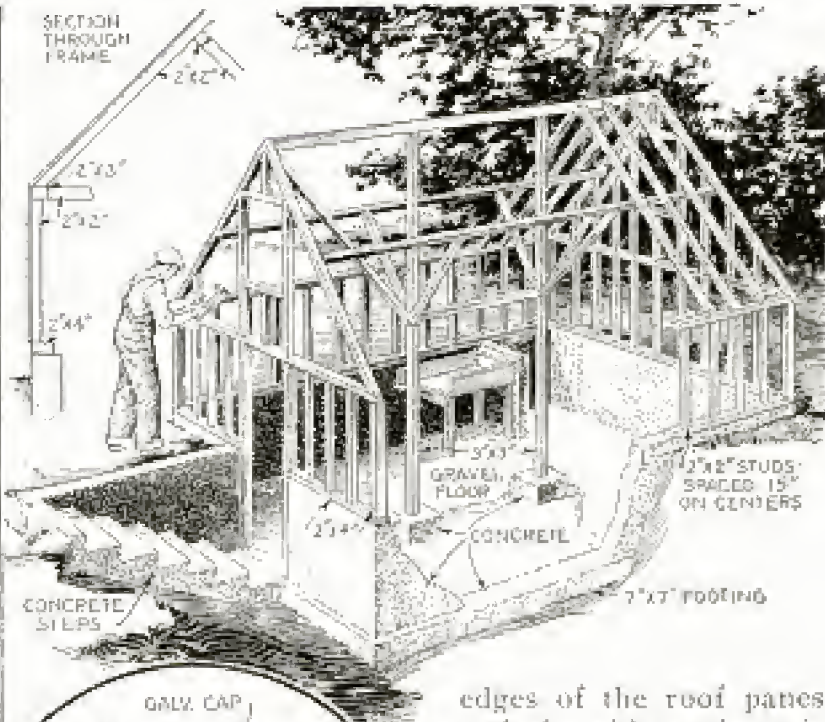
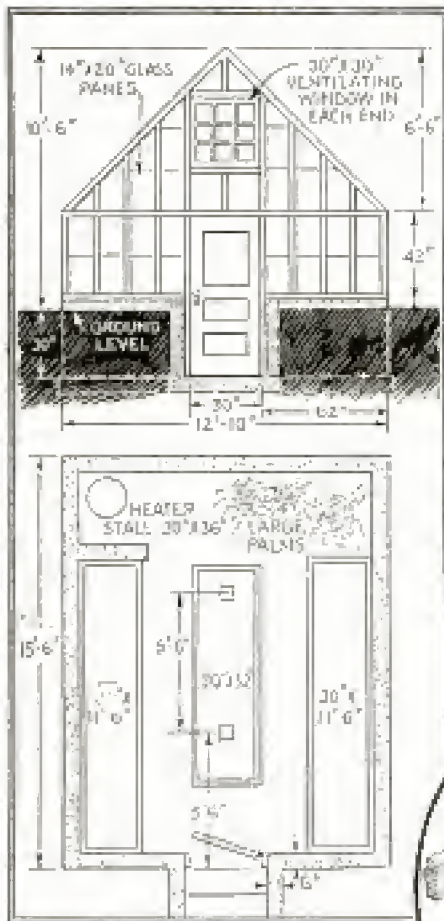


Application Keeps Mosquitoes Away

If the face, hands and other exposed parts have received an application of a mixture consisting of 1 oz. of glycerine, 5 drops of creosote and 5 drops of eucalyptus, mosquitoes will not come near. The odor is very effective in preventing bites and is not unpleasant to the user.

☛ To make commercial crack filler harder and tougher add 5 parts of wheat flour to 12 parts of filler, using water in the usual way to make a stiff paste.

A Small Greenhouse for All-Year Gardening



Built in your spare time, this greenhouse will cost only a little more than a garage of the same dimensions. Excavate to a depth of 30 in., with 7 in. additional for the footings. The excavation should be somewhat larger than the floor plan to permit setting the forms for the concrete. For the latter, use three parts of dry clean sand, four parts of gravel to one part of cement, and sufficient water for pouring consistency. Set a number of anchor bolts along the top of the wall to hold a 2 by 4-in. sill. Four corner posts and a door frame are made of 2 by 4-in. stock. Studs and rafters of the same stock should be spaced 15 in. on centers, which permits the 14 by 20-in. panes to overlap on the studs and rafters $\frac{1}{2}$ in. A narrow strip is nailed along the center of the studs and rafters for brads to hold the panes. On the roof, the lower edges of the panes overlap, but this is not necessary on the sides, provided they form a snug butt joint. Putty is put along the

edges of the roof panes and the ridge piece is capped. At each end, there is a window for ventilation, manipulated by a sash cord through pulleys. The door opens inward, and the concrete stairway should be protected by a 4-in. parapet to prevent heavy storms from flooding the floor. The latter, by the way, should be covered with a

4-in. layer of gravel for drainage. A hot-water system is preferable to others, with the piping running under the plant boxes or along the concrete walls. Uniform distribution of heat is necessary. A stove is not advisable, as it will overheat plants in the immediate vicinity and neglect those in the corners.

Auto Top Patched with Asphalt

Small holes in an auto top can easily be patched with asphalt heated until it flows freely. Cut a piece of cheesecloth slightly larger than the hole to be repaired, and pour some of the hot asphalt over it, taking care not to put on too much. It will spread out thin and make a neat, waterproof patch, which, if thin, will not run when heated by the sun.



Machine Fed by Hay Loader Bales Scattered Straw Left in Field by Combined Harvester and Thresher

Baling Straw Left by Combined Harvester

A method of baling straw after grain has been cut and threshed with a combined harvester, has been devised by I. D. Mayer of Purdue University. The baler, having a platform built on either side for workers, has a hay loader fastened alongside, which feeds the straw onto a rack from which it is pushed into the baler. Guards made of iron rod protect the worker who feeds the baler. The entire outfit is drawn by a tractor or by horses.

Lustrous Paints for Glass

Sign painting on glass can be done with a mixture of water glass and artists' dry colors ground together in a mortar. Paint made by this process is opaque and flows freely. A transparent paint can be made

by substituting water colors for the opaque pigments. Pour the water glass into the mortar and add the color in small quantities, stirring constantly. To test the depth of the color, smear some of it on glass and view it from the unpainted side. Zinc white produces an opaque white, while bronze powder gives good results for lettering in gold. Aluminum powder should not be used, as its

chemical action is injurious to the water glass. Signs made with water-glass paints are most effective when lettered in reverse, and viewed through the glass. If the sign is to be exposed to the weather, it should be protected with a coat of spar varnish or asphaltum paint. If kept in tightly corked bottles, which should be well shaken before use, paint made by this process will keep indefinitely.

Tin Cans Protect Young Plants from Cutworms

The following method has been successfully used in preventing the onslaught of cutworms on vegetable and other plants: Remove the tops and bottoms from a number of tin cans and smooth the inside edges with a file. Place the cans on a board to enable easy handling, fill them



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with good soil and plant two or three seeds in each can to insure the survival of one strong plant in each can. Keep the plants indoors during cold weather, but expose them to the outer air and sunshine on mild days. When ready for outdoor planting, make holes the correct depth and lower the cans to the level of the surrounding ground. Pour water around the inside edges so that the cans can be drawn upward without disturbing the soil in which the plants are rooted. Allow the lower portion of the can to remain in the ground about an inch, which will effectively prevent cutworms, which crawl just below the surface, from getting to the plants. Use of the cans also was found to hasten growth through the longer retention of moisture, and to prevent wilting and other setbacks.

Cork Holds Window-Display Cards

Pinned to the lower edge of a window-display card, a small cork will hold it in an upright position, the bevel of the cork keeping the card at a slight angle. For



small cards, only one cork is necessary, but for larger ones it is advisable to use a cork at each end. The size of the corks to be used for this purpose depends, of course, on the height of the cards.

Water Glass Fills Dents in Cuts

When a stereotype or halftone has received a sharp dent, which shows up as a white spot in printing, it can usually be made serviceable by placing a little water glass in the hollow and allowing it to dry. Care should be taken not to get any of the liquid on the surrounding surface of the cut. After the water glass has dried, polish the face of the halftone with a piece of smooth paper to remove the surplus.—Floyd Sutton, Versailles, Mo.



Nail Kegs, Mounted on Three-Wheeled Trucks, Serve as Portable Bins in Store

Wheeled Truck Holds Nail Kegs

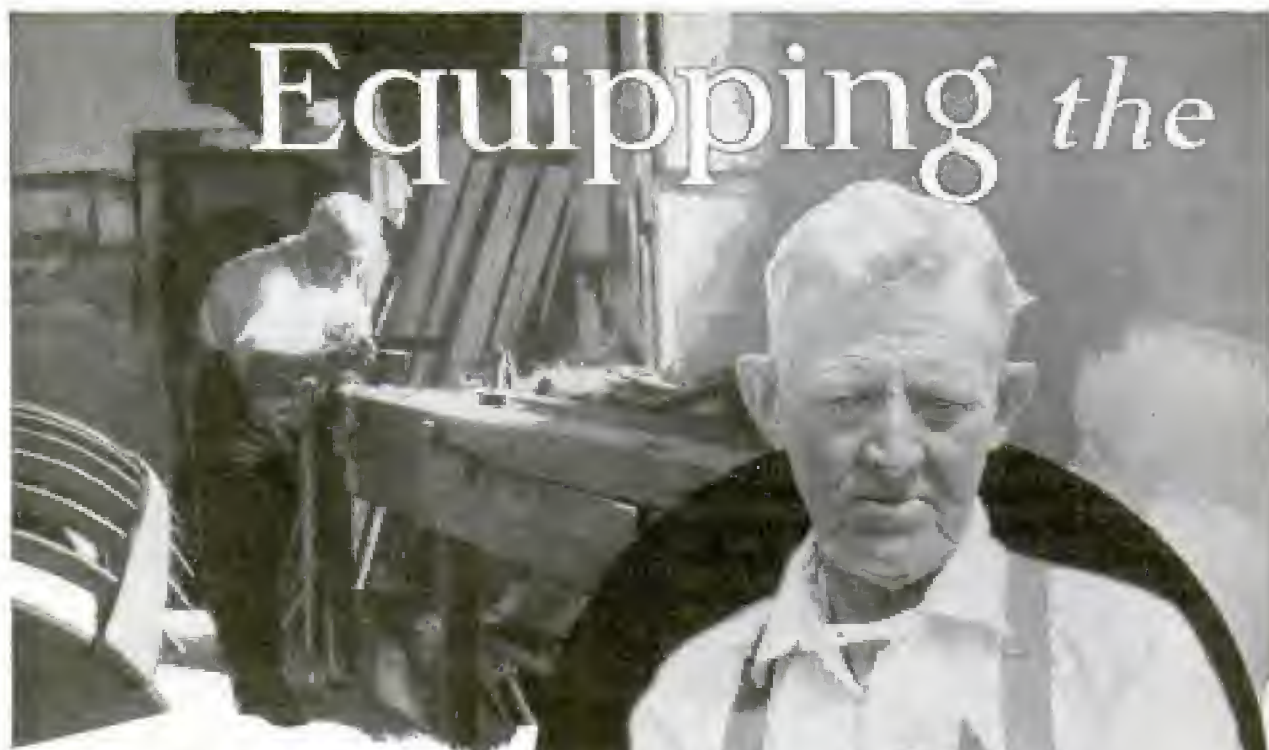
A Wisconsin hardware merchant uses nail kegs for portable bins by mounting them on three-wheeled trucks. The frame is made of flat iron, bent into triangular shape as indicated, each corner being shaped into a loop to receive the shank of a heavy caster. On two of the corners extra loops are formed to take a support which holds up the front end of the keg.

Washer Aids in Grinding Valves with Screwdriver

When grinding valves with a screwdriver, it is rather difficult to keep the hands from slipping off the handle, due to the necessary downward pressure on the valve. A large washer soldered to the shank will overcome this trouble and keep the hands on the handle regardless of the pressure exerted.



Equipping *the*



By
W. Clyde Lamney

Part I—The Workbench

AS the home workshop is usually built up over a period of time by additions needed, the workbench should be designed to have plenty of space for storing tools and equipment. The bench shown in Fig. 1, is well suited to average requirements and differs from the usual cabinet bench in that the entire space below the top is utilized for drawers. Figs. 2 to 3 show details of its construction. The method of joining the frame is such that the work may be done with the simplest hand tools. If the overall length as given is too great for the available space or for individual needs, it can be reduced to suit. For durability and rigidity, as well as appearance, a bench of this type should be constructed of seasoned hard maple, with the exception of the end and back panels, the drawer runners and guides, and the drawer bottoms, sides, and backs, which may be of any of the cheaper woods, preferably white pine. The end and back panels are of $\frac{1}{4}$ -in. birch plywood and the drawer bottoms may be of the same material.

The work of building the bench begins with the end and center frames of the un-

derstructure, which are assembled from 2 by 4-in. maple, the cross-sectional size of which is usually $1\frac{1}{4}$ by $3\frac{3}{4}$ in. after surfacing on the four sides at the mill. The stock is cut to the lengths indicated in Figs. 2 and 3, both top and bottom cross-members being the same length and having both ends beveled equally. After cutting the four members of the two end frames to length, they are grooved $\frac{1}{4}$ by $\frac{1}{4}$ in. on the inner edges, the groove centering $\frac{5}{8}$ in. from the outer face. Although the best construction would require that the back panels be let into grooves, this is unnecessary, as the panels may be tacked to strips nailed to the top and bottom stretchers and the end and center uprights. Triangular strips, ripped from hardwood and fastened in place with finishing nails, will serve as molding. The same method may be used in placing the

HOME WORKSHOP

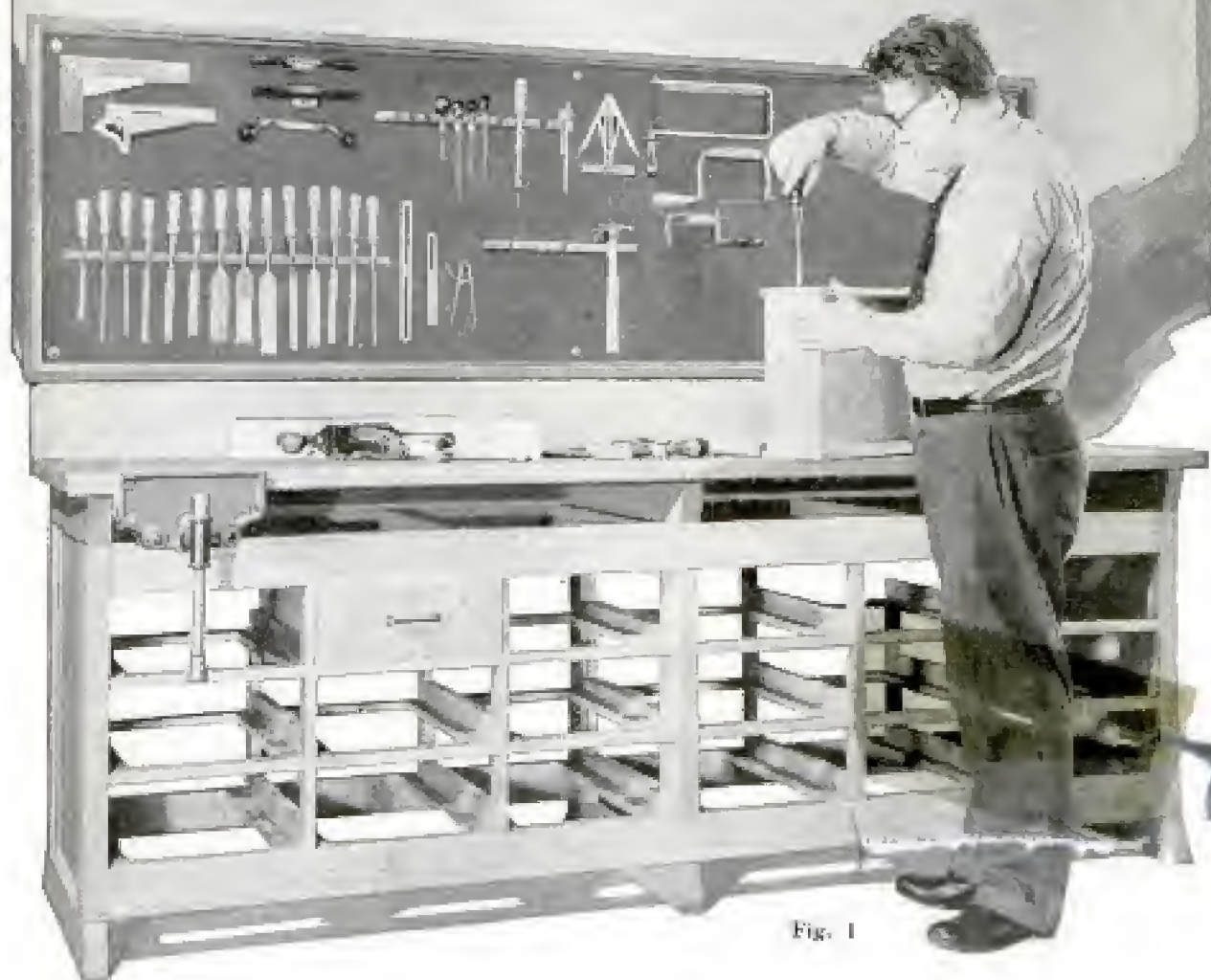
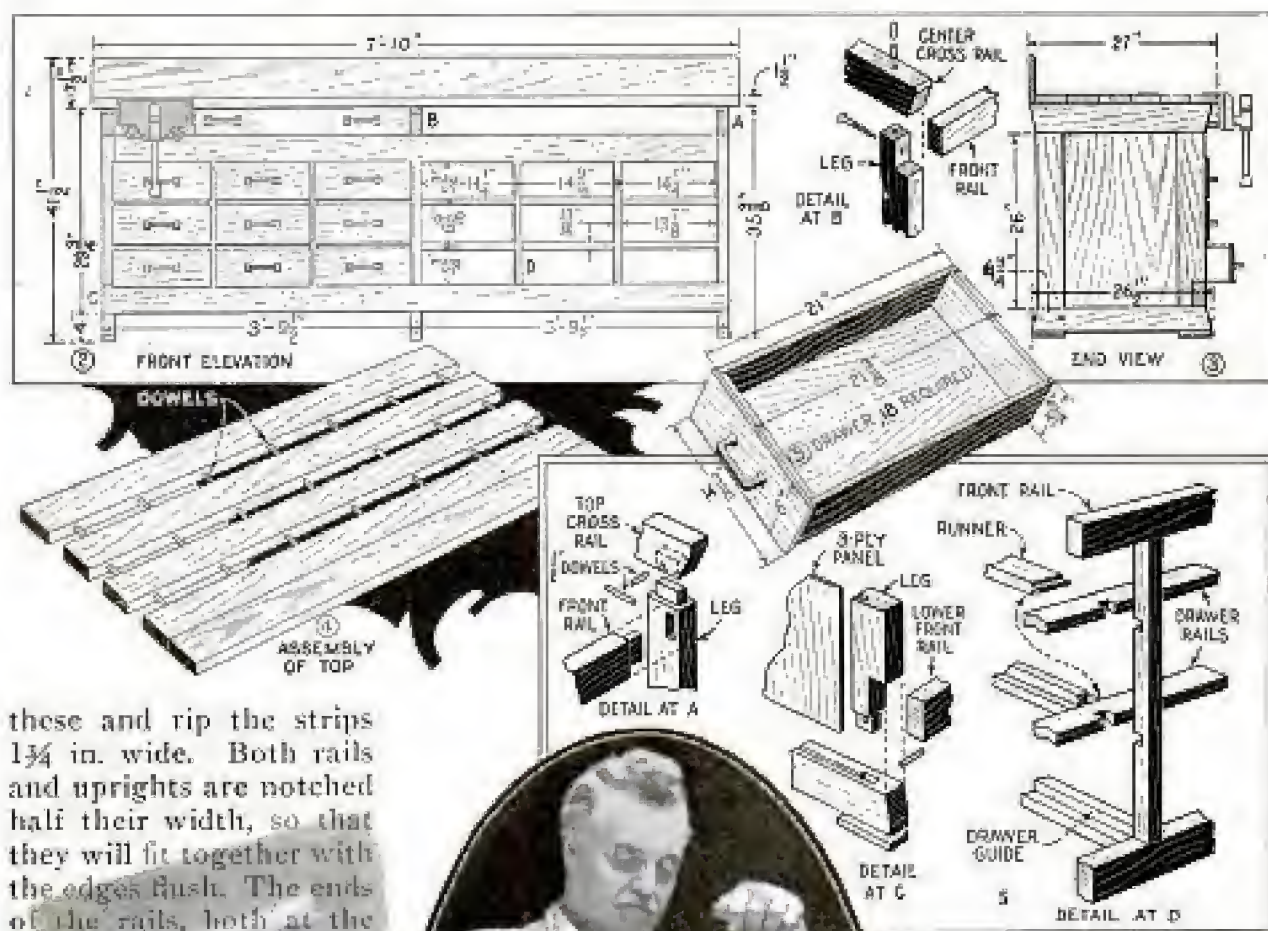


Fig. 1

end panels, if you have no suitable means of grooving the hardwood stock. As will be noted from details A, B and C, in Fig. 2, and the corresponding details in Figs. 3 and 5, the four corners of the frame are joined with pinned mortise-and-tenon joints. Exact size of the mortises and joining tenons is of no particular importance, except that the shoulder cuts should be square and the tenon should be a snug fit in the mortise. After the joints are made, the panels are placed in the grooves and the surfaces are coated with casein glue and drawn tight with clamps. While in the clamps the $\frac{1}{2}$ -in. holes for the pins are bored, and the latter are driven in and the ends trimmed flush. The bottom stretchers are let into the uprights both front and back, as will be noted from Fig. 5, detail C, but the top stretchers are let

into the center frame only, the ends being tenoned into the uprights at both front and back. Care must be taken to get the top and bottom stretchers exactly the same distance apart throughout the length, or there will be difficulty in fitting the drawers. The tenoned ends of the top stretchers are pinned as before, but are joined to the center frame with heavy screws, the heads of which are counter-sunk below the surface and the holes filled with hardwood plugs or wood screw-hole buttons. Likewise the bottom stretchers are joined to the uprights with heavy screws. All joining surfaces are glued.

With the bench frame built, the drawer rail and runner frames, shown in place in Fig. 1, are fitted. First the front rails and supporting uprights are cut to fit in their respective places. Use $1\frac{1}{8}$ -in. maple for



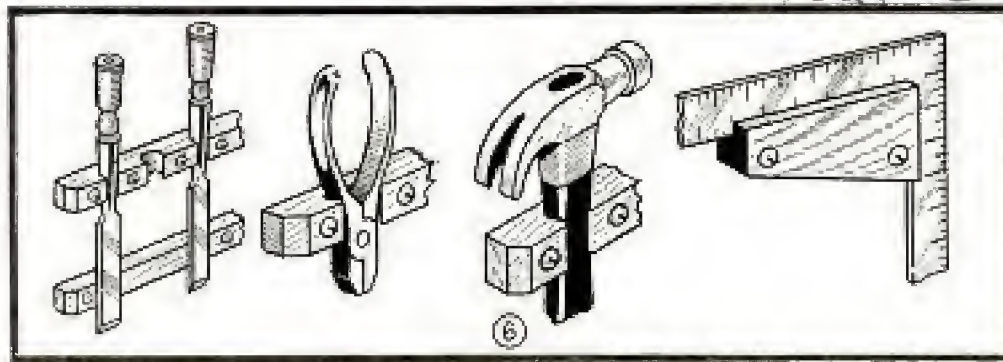
these and rip the strips $1\frac{3}{4}$ in. wide. Both rails and uprights are notched half their width, so that they will fit together with the edges flush. The ends of the rails, both at the front and back, are let into the bench-frame uprights at the ends and center a notch, $\frac{1}{4}$ in. deep, being sufficient to provide a suitable bearing. When cutting the notches, care should be taken to insure a neat fit, and the center-to-center distance each way must be exact. After the notches are cut, the parts are glued in place. The bottom-drawer runners are nailed to strips tacked to the inner faces of the front and back stretchers. Although the intermediate runners may be simply toenailed in place, a better method is to dowel them by first drilling $\frac{1}{4}$ -in. holes into the back edges of the front rails, stopping the drill before it breaks through. Then short pieces of $\frac{1}{4}$ -in. dowel are driven into the holes, and corresponding holes are drilled in the joining ends of the runners, the same distance apart at both ends. One end of the runner is driven onto the dowels in the front rail and the other end is placed in



position, after which $\frac{1}{4}$ -in. dowels are driven through from the outer edges of the back rails. The guides are simply strips nailed to the center of each runner.

Building up the bench top is the most difficult part of the construction, as it involves the edging and joining of heavy stock, as in Fig. 4. With care, accurate work can be done with

the jointer plane, however, and if six or eight bar clamps are available, it is comparatively easy to dowel and glue the several pieces to form the top as shown. Birch dowels, $\frac{1}{2}$ in. in diameter, are used. Care must be taken to get the dowels accurately centered on each joining edge, and when clamping the work, the bar clamps should be placed alternately on opposite sides. If the clamps are placed thus and drawn up uniformly, they will exert the necessary pressure without springing the parts out of true. The top



is finished by planing first across the grain to true off the high places, then lengthwise and afterward sanding it smooth. The top is fastened with heavy screws, the heads being countersunk below the surface, and the holes filled with hardwood plugs, cut and sanded flush. Another method of building up a top of this size is to glue and screw together two $1\frac{3}{8}$ -in. birch plywood panels, making a top $1\frac{1}{2}$ in. thick. The edges are planed true, and facing strips of $\frac{3}{4}$ -in. maple are mitered at the ends and glued and screwed to the edges of the top.

The front pieces of all drawers, except the two fitting the top compartments, are of the raised-panel type. The sides are cut to length from $\frac{1}{2}$ -in. stock, grooved $\frac{1}{4}$ by $\frac{1}{4}$ in. to take the bottom and back, and the sides are simply glued and screwed to the front pieces. The bottoms should be a loose fit in the grooves and only the back piece is glued in. An allowance of $\frac{1}{8}$ in. should be made over the top and sides, otherwise the drawer will fit the opening too snugly and will swell and stick if exposed to dampness.

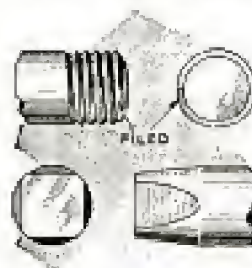
The bench is completed with brass pulls on all drawers, a rapid-acting vise and a planing stop. To finish, sand and apply two thin coats of white shellac. The board at the back edge of the top may be any width the builder desires, or it may be omitted and a plywood panel substituted to provide space for tool racks, as in Fig. 1. The tool panel may be fastened either to the wall or to the back of the bench. Fig. 6 suggests methods of hanging tools most frequently used on the back panel. In addition to the common tools shown, it is best to hang, by means of suitable racks, all edge tools, such as hand and circular saws, chisels and gouges, spoke-shaves, and the like. In this way, the edges



will be protected against damage that would result were they placed in the drawers, and the tools are always within reach when needed.

Filing End of Threaded Stock Helps in Starting Nut

Cross-threading when starting a nut can be prevented by filing away one-half of the first thread. When threading over-size stock, it is helpful to grind the end down as shown in the lower details, which permits a die to take hold better than when it is tapered. In the absence of lard oil, candle shavings make a good lubricant for thread-cutting dies and taps.



☞ Cleaner for old copper and brass ware can be made by mixing 3 oz. of Spanish whiting, 2 oz. of tripoli and $\frac{1}{2}$ oz. of finely powdered oxalic acid; apply the polish on a clean damp polishing cloth.

Cutting Blades on Bench Vise Make Powerful Shear



Powerful shears can be made by screwing cutting blades of tool steel to the jaws of a machinists' bench vise. The steel is annealed and then drilled and cut to the shape shown in the detail, after which it is tempered and the cutting edges ground. Corresponding holes are, of course, drilled and tapped in the vise jaws for attachment of the blades.

How to Remove Mildew Stains

Mildew stains may be removed from cloth after washing in the customary manner and immersing in hydrogen peroxide or in a solution of chlorinated lime while still damp. Then expose the spot to the sun's rays. If the material to be bleached is colored, a test on a scrap piece or on the selvedge should be made to determine whether or not the dye is affected.

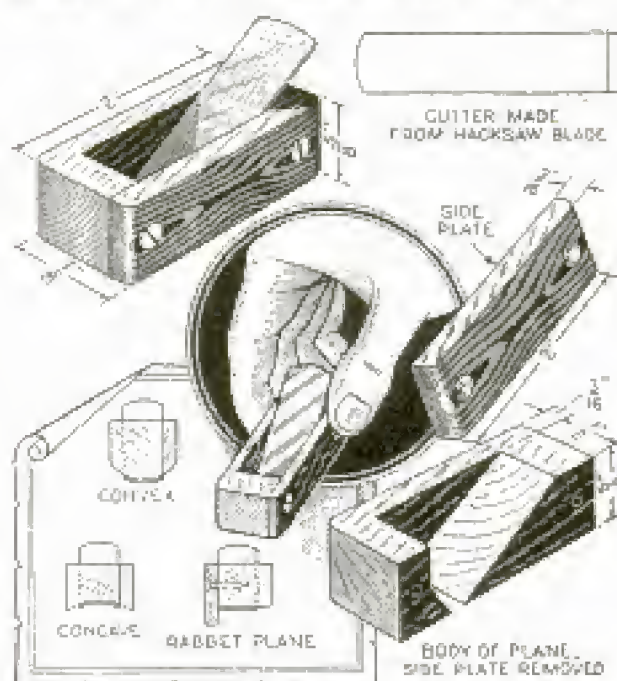
Acids Have Many Shop Uses

Acids can be adapted to many uses in a shop, other than soldering and etching. Immersion in nitric acid, for instance, will reduce the size of a metal part when it is just a little too large for the purpose at hand. A slight application of acid will also, due to its corrosive action, slightly increase the size of metal pieces. Loose

nuts, machine screws and collars that have a tendency to work loose, can often be tightened by applying a little acid. Loose tool handles can sometimes be secured by dipping the metal shank into the acid and rolling it in metal filings, before inserting it into the socket. Care should be taken, of course, not to get acid on the hands or clothes. Any container can be made into a good acid receptacle by impregnating or coating it with melted paraffin. A medicine dropper is good for applying small amounts of acid, or a small ladle may be cut and hammered out of sheet lead, but a rubber brush is better for applying muriatic acid along seams when soldering. To keep acids out of the reach of children, yet readily accessible, a small locker with a self-closing and locking door is especially good, as it cannot be left open inadvertently.

Thumb Plane for the Modelmaker

Made of hardwood, a piece of hacksaw blade and a couple of screws, this small plane is useful in shaping wooden parts for models. The body of the plane consists of two pieces, which clamp the cutter securely between them. If care is taken when grinding the blade to shape, retempering will not be necessary. The detail shows a number of variations of this idea along the line of small molding cutters.



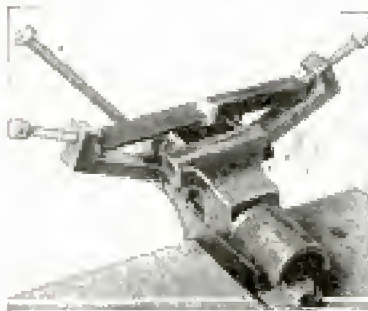
Thumb Plane to Smooth Small Pieces Is Handy Addition to the Modelmaker's Kit

Auto Generator Runs as a Motor on Thirty-Two-Volt Current

After discovering that almost any type of auto generator would operate as a motor on a 32-volt system, I mounted one on a stand to drive an emery wheel equipped with a buffer and a chuck for drills. The stand was made by screwing one-half of a differential housing to the floor, in a vertical position, and mounting a board on top of it. I screwed one end of the board to the wall to make the stand more rigid. This arrangement, with which I was able to do grinding, drilling, etc., can be applied by anyone at practically no cost where 32-volt current is available.—C. I. Wagner, Washington, Iowa.

Clamps Hold Wide Work in Vise

Wide work can be held in a small vise by gripping two clamps at an angle in the vise, as indicated. The clamps should be arranged so that the screws can be forced down on the work securely. This method

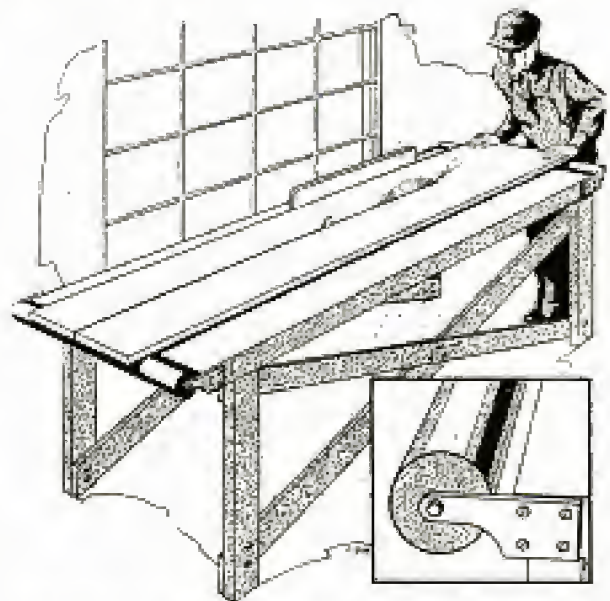


is also convenient when the ends of two short pieces must be butted tightly in soldering.—H. Moore, Hamilton, Ont., Canada.

Rough Edges on Glass Smoothed with Emery Stone

Fine pumice and emery stone will smooth sharp or rough edges on glass. Dip a coarse emery stone in water and rub it over the glass with a forward motion until the edge is removed. Then repeat the operation with a medium stone and finish with a fine one. Next smooth the edge with pumicestone and polish it with a piece of felt or woolen cloth. With a little practice, you will be able to obtain a rounded and highly polished edge.—Joe Williams, Los Angeles, Calif.

☛ When putting on a new engine-head gasket, the cylinder-head studs should be retightened after the engine has been run long enough to be thoroughly heated.



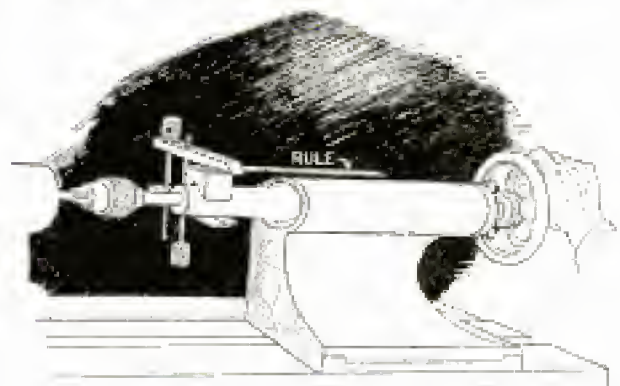
Rollers at the Ends of Saw Table Reduce Friction When Ripping Heavy Stock

Rollers on Saw Table Help When Ripping Long Board

Mounted one at each end of a saw table, two rollers will allow heavy stock to be fed into a saw with ease. Metal brackets hold the rollers slightly above the top of the table to eliminate the friction caused by the work sliding on the table.—W. Fred Jensen, Little Ferry, N. J.

Depth Gauge for Drilling with Lathe

Clamped to the tailstock spindle by means of a small V-block and woodworkers' clamp, a rule can be held to project lengthwise over the tailstock frame. By noting the measurement in respect to a line scribed on the tailstock, the spindle can be moved any desired distance by observing the relation between the rule graduations and the mark on the tailstock.—Henry S. Laraby, New Haven, Conn.



Drilling to Any Desired Depth with the Aid of a Rule Clamped to Lathe Tailstock Spindle

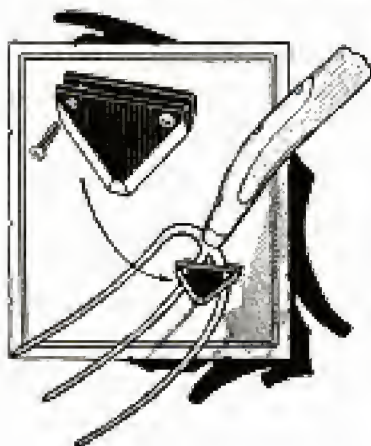
Extra Leg Keeps Painter's Ladder Straight



Adjustable Extension Leg Keeps Ladder from Sliding Toward One Side on Uneven Ground

When setting a ladder on sloping ground, this adjustable leg will help to keep it from tipping toward one side. The leg is a length of 2 by 4-in. hardwood with evenly spaced notches cut on either side. An iron clamp, wide enough to fit the leg of the ladder, is bolted to it in the position indicated. When the leg is in position the notches engage the rungs of the ladder so that it will be held in an upright position. The clamp supports no weight but insures that the extension leg is held firmly against the side of the ladder.

Sheaf-Band Cutter for Pitchfork



Farmers feeding grain in the sheaves can make a useful band cutter by riveting two mower or binder-sickle blades together over two times of a pitchfork as

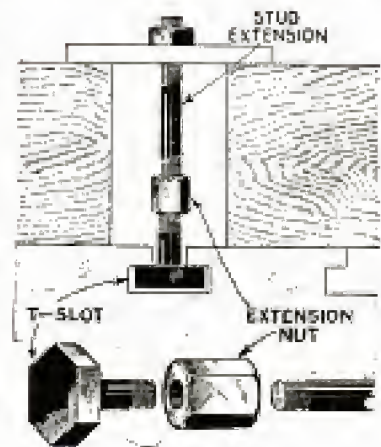
shown. To use the cutter, hold the sheaf down with one foot, slide the outer tine under cord and run the blade up to cut it. —Arthur C. Schofield, Craven, Sask., Can.

Giving Lathe Tools Extra-Hard Cutting Edge

Forgings and castings, which have exceptionally hard surfaces, can easily be machined with a tool that has been especially treated for this purpose. It is subjected to the usual hardening method, but just before it comes to the quenching point, reach into the furnace with a long-handled borax spoon and pour a thimbleful of cyanide of potassium (poison) on the point of the tool; then immediately quench it in oil. Be sure that the handle of the spoon is about 2 ft. long, for cyanide spatters when applied to hot steel. This method produces extra-hard cutting edges for machining such work.

Stud Extensions on T-Slot Bolts

In order to eliminate the necessity of keeping a variety of T-slot bolts on hand for use on the bedplates of milling machines, planers and shapers, extensions can be made from studs. An extension nut is screwed onto the end of the T-bolt and an extra stud is driven into the nut, as indicated in the drawing.



Storage-Battery Corrosion Serves as Soldering Flux

After experiencing trouble in getting solder to adhere to a piece of steel by ordinary methods, I took some of the corrosion, or copper sulphate, deposited on the positive pole of a storage battery, and rubbed it on the work. This caused a thin copper deposit to form on the steel, and after removing all the sulphate, no trouble was experienced in getting the solder to stick. —C. H. Peterson, Torrington, Wyo.

Water-Pump Packing of Rawhide

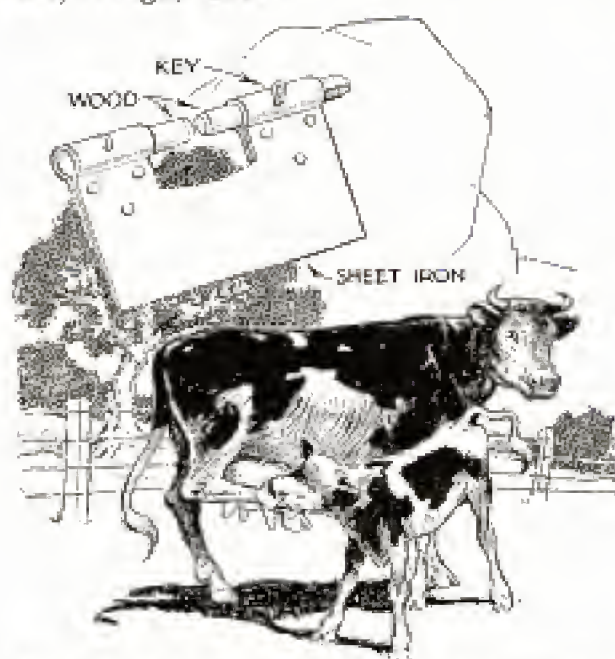
Shafts on centrifugal water pumps sometimes score or wear down in grooves, which soon grind out the packing. This trouble can be overcome by substituting rawhide for the regular packing material as it will wear longer, and when wet, swells and seals the pump so that no water can leak out. The pump on my car has been packed with rawhide for over a year without the need of renewal.—Irl Gordon, Akron, Ohio.

Spray That Kills Plant Parasites

A spray that will destroy most plant parasites can be made by dissolving 5 lb. of copper sulphate and 5 lb. of quicklime in 50 gal. of water. This spray may also be used on apple, pear and cherry trees. It will control most cases of apple scab, bitter rot and cherry-leaf blight and will not cause any scalding.

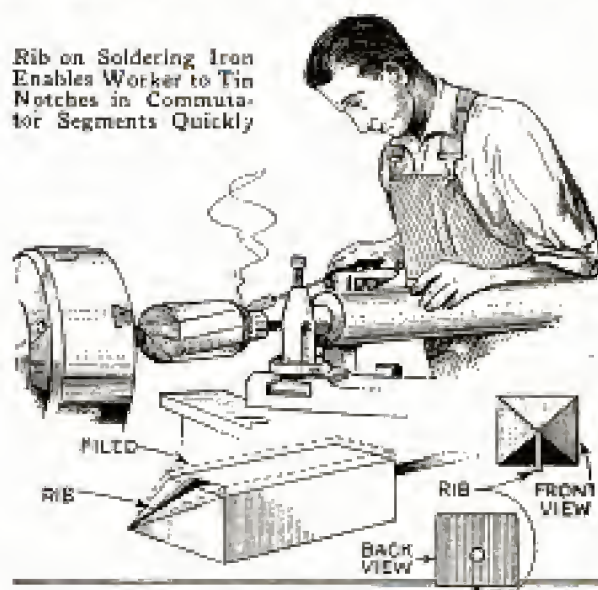
A Homemade Calf Muzzle

A good calf muzzle can be made from sheet metal, cut and bent over two wooden pins as shown in the detail. One end of each pin is rounded to prevent injury to the calf's nose. Cotter keys, slipped into holes drilled through both metal and pins, hold the latter in position and prevent loss of the muzzle.—Luther Strosnider, Onaga, Kans.



Here Is a Sheet-Metal Muzzle That Weans Suckling Calves without Injury to Mother

Rib on Soldering Iron Enables Worker to Tin Notches in Commutator Segments Quickly



Rib on Soldering Iron Fits Commutator Notches

Soldering coil leads to commutator segments can be done easily if one side of the soldering iron is filed down to leave a rib near the point, as shown in the detail. This fits the narrow slot in the end of each segment of the commutator, and enables one to tin the slot before inserting the coil ends without getting the solder all over the surface of the segment.—John A. Blaker, West Auburn, Mass.

Scrubbing Floors with Liquid Soap

Anyone who has much floor scrubbing to do, will be interested in the fact that the sleeping-car industry was able to effect a great saving of soap by using a solution instead of bars. It was found that 12 lb. of chip soap dissolved in 50 gal. of water, made a solution that rubbed up to a good lather. For floors stained with oil or grease, add a little lye or washing soda, but not for use on painted or varnished surfaces. For tile floors, it may be necessary to sprinkle fine sand or pumicestone as an abrasive before scrubbing. The solution is effective for cleaning Wilton carpets by spreading it on the surface and scrubbing it up to a lather with a brush. The stiff suds are then scraped off and the carpet sponged lightly. The nap dries quickly in a clean and fluffy condition.

Blocks and deadeyes for model ships can be made from heavy leather, by cutting out circular pieces with a punch of the proper size.

Can You Solve *these* Puzzles?



By
SAM LOYD

193 Halsey St.
Brooklyn, N.Y.

AS Perkins stood on Main street, friends on the opposite side discussed his age. One of them said: "If you are smart enough, this will tell you. He is twice as old as his wife was when Perkins was six years older than she is today, and today their combined age is fifty-four years."

DIAMONDS are valued according to the squares of their weights. If a diamond of one carat is worth \$100, then

a two-carat diamond would be worth \$400. A pair of earrings were received in exchange for two stones of different sizes. If each of the four stones weighed one or more carats, no fractions, and a fair basis of valuation for all is \$100 for a single-carat stone, and assuming that the jeweler's profit on the exchange was 20 per cent of the value of the pair of earrings, what would be the least possible value of the two stones? A locket set with 100 gems of three kinds, diamonds, sapphires and turquoises, cost \$1,000. Each diamond was worth \$100, each sapphire \$30 and each turquoise \$5. How many of each kind were used?

Answers to Last Month's Puzzles

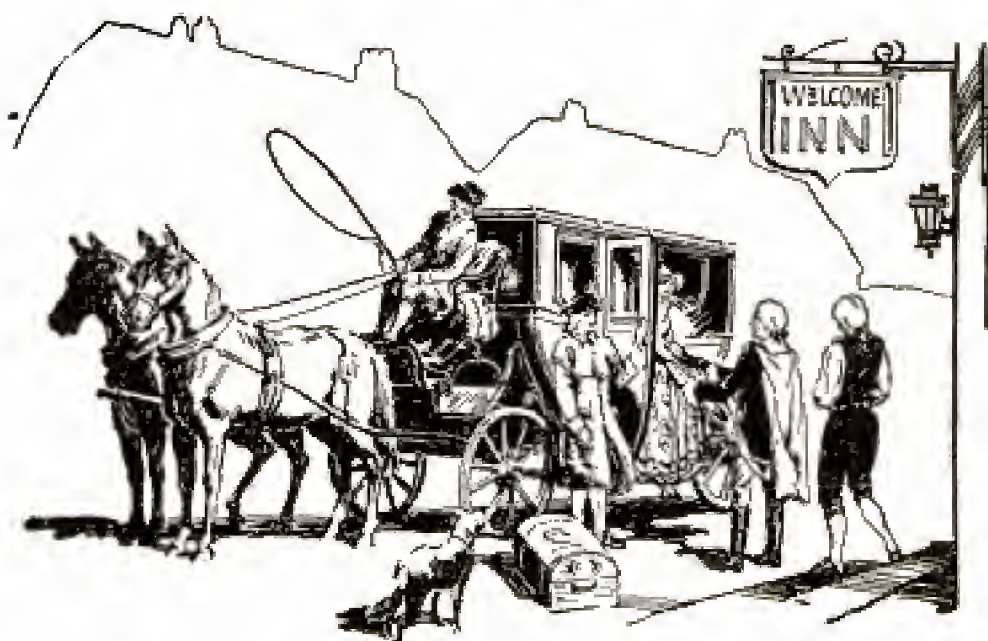
The diameter of the shaft hole, $3\frac{1}{4}$ in., is $\frac{1}{5}$ of the diameter of the stone, $15\frac{1}{4}$ in. The square of 5 represents the area of stone and hole, or in other words, the stone area is twenty-four parts and the hole one part. The twenty-four parts being one-half the area of the original stone, then the stone consisted of forty-eight parts stone and one part hole, or forty-nine parts, and the square root gives the ratio of diameters between stone and hole as 7 to 1. Therefore, seven times the diameter of the hole, $3\frac{1}{4}$ in., gives 22 in. for the original diameter.

The cheese originally cut was worth 25 cents more than the price of $1\frac{1}{4}$ lb. The

customer took half of that; a piece worth $12\frac{1}{2}$ cents plus the price of $\frac{5}{8}$ lb. It cost her 10 cents less than the price of $1\frac{1}{4}$ lb. Therefore, $22\frac{1}{2}$ cents plus $\frac{5}{8}$ lb. would amount to the same as the price of $1\frac{1}{4}$ lb. Five-eighths of a pound would be worth $22\frac{1}{2}$ cents, and a whole pound, 36 cents. The customer bought $\frac{35}{100}$ lb. for 35 cents. Originally she laid 45 cents upon the counter to pay for $1\frac{1}{4}$ lb.

The odd and even numerals in Mrs. Terwilliger's puzzle are arranged in sums to total alike, as follows:

79 $\frac{1}{2}$	84 $\frac{3}{4}$
5	
<hr/> 84 $\frac{1}{2}$	<hr/> 84 $\frac{3}{4}$



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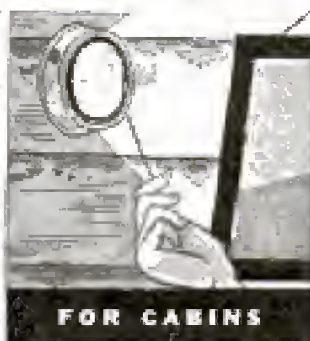
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BIG CITY ANIMAL TRAPPING

(Continued from page 262)

would have to go toward the open cage door.

"Git in there," he yelled suddenly. At the same time he jabbed with the ice shaver and discharged the revolver. With a single spring the animal dived for the cage, landing inside, and the half-paralyzed kennel man let go of the door which dropped with a bang. "You must never," said Ryan, "let an animal know you are scared."

"What are your hands shaking and trembling for then?" demanded the chagrined kennel man.

"Oh, I'm scared all right," said Ryan, "but I said nothing of that to the lion."

Once not long ago the alarm flashed to police headquarters, and then relayed to the animal shelter and Ryan, was, an astounding statement that a hotel near Times Square was full of big snakes. There were two in the deserted lobby when Ryan came, and he saw another slithering down a staircase. He recognized them as pythons. With a forked stick he pinned the heads of each in turn to the thick carpet and then dropped them into a sack. None was more than seven feet long. The one he found out on the fire escape, six stories above the street, was eight feet long; and there were two more loose in the room from which the others had escaped. The owner, a woman snake charmer, having lost her job at Coney Island, had left the snakes free in her room and somebody opened the door.

"Naw," said Ryan, "I wasn't scared. I had on my dog-catcher gloves."

"Well," said Doctor Garbutt, "the time the boa constrictor got loose down in the Bowery I was scared. A man who wanted to buy a big snake for a show asked me to look at this one to see if it was free from skin disease. I went to the animal dealer's store. The walls were lined with cages. The cage in which they had the boa constrictor was higher than a man's head. One of the employes put a leather strap around its neck quite deftly and drew it part way out of the cage. Then another man took hold and lifted out another yard; and then another man, and so on, until six of them had the creature stretched on the floor where I could look at it. I

(Continued to page 116A)



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BIG CITY ANIMAL TRAPPING

(Continued from page 114A)

was down near the middle where its body was thick as a man's thigh when the head whipped out of the noose. Instantly there was a yell and all of the men let go and jumped away.

"I did not know a snake could move so fast. Someone had the presence of mind to lock the front door. It was the proprietor who succeeded in throwing a cloth over the boa's head and then inducing the other men to wrestle its writhing body into submission. They had their hands full and I tried to help by opening the cage door. Consequently, when the men nearest the head let go, two yards of boa struck at me. I saw deep in its whitish-red throat, saw its inward-curving fangs—and ducked. It scraped my cheek and ear and covered my face with its saliva. Why, those teeth were like stilettos."

Most of Ryan's hardest work has to do with horse rescues. In summer, they drop from heat prostration and he brings them to the hospital in the ambulance. In winter, they slip and fall on icy streets and he gets them back on their feet. Often a horse's leg slips into a sewer catch basin through the slot in the curbstone. Seemingly Ryan alone knows that the only way to extract a horse from such a situation is to remove the shoe from the trapped foot. Then the hoof can be contracted, or whittled, enough to get it out.

Once the horse he was sent to get was in a coal company's stable yard. Each time it was approached it charged. Ryan lassoed it, secured it in his ambulance and was driving back when in his rear-vision mirror he saw something that sent shivers down his spine. The horse had lifted a foreleg and was biting its knee. That, Ryan will tell you, is a symptom of rabies. His passenger was a rabid horse. He has seen two in twenty-one years. Of course, it had to be shot.

Rabid horses, frantic elephants, truant monkeys and foot-loose lions are just part of the day's work for Ryan, but when he surveys the work at the end of a year, it is the rescue of cats that stands out as the high-water mark of his trouble.

Cats are constantly getting themselves into difficult situations. Then they call for help, and generally it is Ryan who has to go to the rescue. He always gets his cat.

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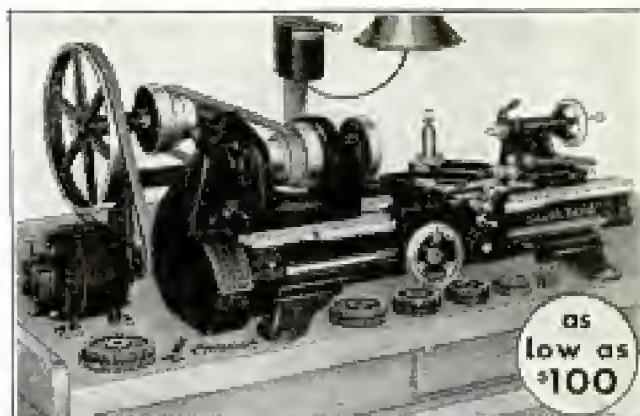
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HOME TRIAL

SKYSCRAPERS OF THE FUTURE

(Continued from page 179)

our buildings at less cost and design them to last only just as long as their interior equipment will last. Lowered cost and more frequent replacement may point the way for the building industry to adjust its production costs in line with other business.

Science, mechanization and factory methods are entering the building industry. There has been more advance in the past eighteen months through the use of new materials and new methods than in any previous hundred years in the history of the world. If we change our obsolete building laws, I am convinced that the tall buildings of the future, intended to last only two decades, will be built for 30 cents a cubic foot, compared with 60 cents to \$1 per cubic foot of space for structures built in the post-war period up to 1930.

Think of what construction such as this will mean to business in general. The business section of any city fluctuates and moves in a few years. The hotel of today may be the financial institution of tomorrow and the warehouse of the day after. Remodeling present-day structures as their environment and usefulness change is expensive, and, at best, results in only a makeshift.

These new construction methods will tend to check the tendency to shift established business centers. In the past it has cost the same to build in one place as another, so the promoter, in order to compete, had a tendency to build on fringe locations where a cheaper ground value could be obtained. Now he can afford to build on property of high ground value right next to old established downtown structures, and because of the new construction costs, can afford to rent his building at cheaper rates per square foot than his neighbor, and this leads one to believe that many commercial structures built prior to 1930 are today competitively obsolete.

Tomorrow's skyscraper probably will not be a skyscraper at all in the ordinary sense of heavy steel and masonry. It will be a building of light-weight synthetic materials, which can be salvaged in large part when it is razed, and it will have a

(Continued to page 120A)

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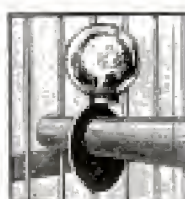
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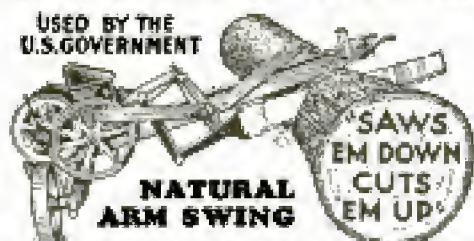


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SKYSCRAPERS OF THE FUTURE

(Continued from page 118A)

comparatively light metal frame because the load it must support will be reduced. For this reason there will be no need to go so deep for a foundation. The metal frame may not be steel. It may be an alloy that is rustproof, and it may contain aluminum to lighten the weight.

Its walls may be of enameled metal or similar material. Certainly they will not be more than three or four inches thick and they will be made at a factory and come ready to be attached to the frame. Two inches of insulation between outer and inner surfaces will afford as much protection as a masonry wall today.

Interior walls may be of metal, plaster or composition material, with partitions so arranged as to be readily changeable, thus making rearrangement of rooms and offices easy. If plaster is used, it will come in sheets, pre-painted with a substance like that used as a finish on automobile bodies.

There will be virtually no windows, all illumination originating from gaseous tubing or similar cold light in torches free-standing on the floor, and light fixtures attached to wall and ceilings may be relegated to the ash heap. Wiring will be contained in metal bases and troughs, so arranged as to be easily accessible without tearing up metal flooring covered with cork or rubber.

The heating plant will not only warm the building in winter and cool it in summer, but there will be provision for washing and humidifying the air. The accessories will be the most modern obtainable when the building is erected, and will be designed to last the life of the building without alteration or replacement.

I feel that the occupants of such a structure, whether it be of fifteen stories or a hundred and fifty, will live in more healthful and comfortable surroundings than are possible in the most luxurious office buildings today. For I know that what we are going to see in the next ten years in the building industry will make our heads swim. And nearly all of the development is coming from the scientist in his laboratory, whose magic touch the building industry is just beginning to feel.

ⒸPompeii, the Italian city destroyed by a volcano in 79 A. D., had a one-way street.

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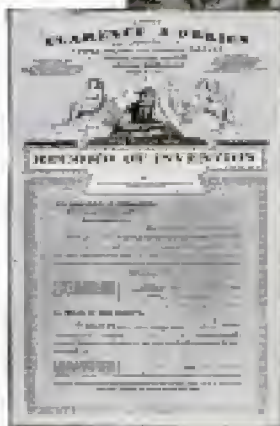
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SIX MILES PER MINUTE

(Continued from page 181)

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It is neither the desire for a "comeback" nor the craving for glory that prompts me to try to bring the record back to America with an American driver and an American car.

I am not trying to comeback. I have never been away. It is a straight business proposition with me, made more interesting, perhaps, because of the patriotic aspects.

Physical condition counts for a whole lot in speedway racing, but not for so much in breaking straightaway records such as I expect to do at Daytona Beach.

I'm as smart as I was twenty years ago, and it takes intelligence to beat those Daytona beach sands. If you check up, you'll find that it is the youngsters who find success on the speedways, but veterans have broken the Daytona records. That business is for us older men. We're smart enough to have everything just right before we try roaring down those sands at 250 or 300 miles an hour.

I have thirty-eight years of racing experience behind me. After racing with bicycles from 1894 to 1902, in that year I wound up in Salt Lake City with a motorcycle imported from London. It had made forty miles an hour on the indoor track in the Crystal palace.

Everybody used low-test gasoline in those days. I did things with that old motorcycle. I bought some high-test gas first of all. Then I raised the compression of the engine by taking off the cylinder head and filing down the top of the cylinder. I tried it out, and it went like blazes.

All our races were held at night, but my practicing was done in the daytime. I soon discovered that the bus didn't have the same power and speed in the cold night air, so I piped the hot exhaust around the carburetor. That crude scheme was the birth of modern hot-spot and down-draft carburetors.

Then I got a telegram from Tom Cooper saying he had joined with Henry Ford in the building of two racing cars with four great big cylinders, and wanting me to drive one of them.

(Continued to page 124A)

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SIX MILES PER MINUTE

(Continued from page 122A)

When I landed in Detroit, I found the cars about half finished. Cooper put me to finishing them. I was far from a skilled mechanic, but I was a good backyard sledgehammer mechanic, so we finally finished the "999."

I'll never forget the day of my first race in the old Ford "999." It was at the Grosse Pointe track near Detroit. I'd never driven an automobile in my life and had only ridden in one twice. The motor let out a roar that deafened me. About noon, Henry Ford and Tom Cooper came out and put it to a trial.

They picked me to drive in the race. Alexander Winton was there with his Winton racer. So was Charlie Shanks in another Winton and Harry Harkness in a Mercedes. There were also a White steamer, a Geneva steamer and a Maxwell.

Winton had been getting a lot of glory and was setting records right and left. Just before the race, Billy Metzger, later of the E. M. F. company and recently with Cadillac, offered me \$250 if I'd beat Alexander Winton. Everybody there was more experienced than I, especially Winton. But I had my eye on that \$250.

Henry Ford came up just before the race started. "Don't be a fool, Barney," he said, "you can't win and you may be killed."

"Don't worry about me," I answered. "I may not win in this chariot, but if I don't they'll say I was going places when she took me through the fence."

And I did go. I didn't dare look around. I didn't shut off on the turns. I was half a mile ahead at the finish.

And that's the way I'm going at Daytona Beach next winter in my 3,000-horsepower Miller special.

If I don't break Sir Malcolm's record, they'll say afterward I was going good when I crashed.

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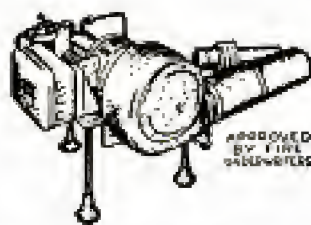
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20x4-40-21"	.40 .10	20x3 1/2	2.25 .50
20x4-40-21"	.45 .10	20x4	2.35 .50
20x4-40-21"	.45 .10	20x4 1/2	2.45 .50
20x4-40-21"	.50 .10	20x4 3/4	2.55 .50
20x4-40-21"	.55 .10	20x4 3/4	2.65 .50
20x4-40-21"	.60 .10	20x4 3/4	2.75 .50
20x4-40-21"	.65 .10	20x4 3/4	2.85 .50
20x4-40-21"	.70 .10	20x4 3/4	2.95 .50
20x4-40-21"	.75 .10	20x4 3/4	3.05 .50
20x4-40-21"	.80 .10	20x4 3/4	3.15 .50
20x4-40-21"	.85 .10	20x4 3/4	3.25 .50
20x4-40-21"	.90 .10	20x4 3/4	3.35 .50
20x4-40-21"	.95 .10	20x4 3/4	3.45 .50
20x4-40-21"	1.00 .10	20x4 3/4	3.55 .50
20x4-40-21"	1.05 .10	20x4 3/4	3.65 .50
20x4-40-21"	1.10 .10	20x4 3/4	3.75 .50
20x4-40-21"	1.15 .10	20x4 3/4	3.85 .50
20x4-40-21"	1.20 .10	20x4 3/4	3.95 .50
20x4-40-21"	1.25 .10	20x4 3/4	4.05 .50
20x4-40-21"	1.30 .10	20x4 3/4	4.15 .50
20x4-40-21"	1.35 .10	20x4 3/4	4.25 .50
20x4-40-21"	1.40 .10	20x4 3/4	4.35 .50
20x4-40-21"	1.45 .10	20x4 3/4	4.45 .50
20x4-40-21"	1.50 .10	20x4 3/4	4.55 .50
20x4-40-21"	1.55 .10	20x4 3/4	4.65 .50
20x4-40-21"	1.60 .10	20x4 3/4	4.75 .50
20x4-40-21"	1.65 .10	20x4 3/4	4.85 .50
20x4-40-21"	1.70 .10	20x4 3/4	4.95 .50
20x4-40-21"	1.75 .10	20x4 3/4	5.05 .50
20x4-40-21"	1.80 .10	20x4 3/4	5.15 .50
20x4-40-21"	1.85 .10	20x4 3/4	5.25 .50
20x4-40-21"	1.90 .10	20x4 3/4	5.35 .50
20x4-40-21"	1.95 .10	20x4 3/4	5.45 .50
20x4-40-21"	2.00 .10	20x4 3/4	5.55 .50
20x4-40-21"	2.05 .10	20x4 3/4	5.65 .50
20x4-40-21"	2.10 .10	20x4 3/4	5.75 .50
20x4-40-21"	2.15 .10	20x4 3/4	5.85 .50
20x4-40-21"	2.20 .10	20x4 3/4	5.95 .50
20x4-40-21"	2.25 .10	20x4 3/4	6.05 .50
20x4-40-21"	2.30 .10	20x4 3/4	6.15 .50
20x4-40-21"	2.35 .10	20x4 3/4	6.25 .50
20x4-40-21"	2.40 .10	20x4 3/4	6.35 .50
20x4-40-21"	2.45 .10	20x4 3/4	6.45 .50
20x4-40-21"	2.50 .10	20x4 3/4	6.55 .50
20x4-40-21"	2.55 .10	20x4 3/4	6.65 .50
20x4-40-21"	2.60 .10	20x4 3/4	6.75 .50
20x4-40-21"	2.65 .10	20x4 3/4	6.85 .50
20x4-40-21"	2.70 .10	20x4 3/4	6.95 .50
20x4-40-21"	2.75 .10	20x4 3/4	7.05 .50
20x4-40-21"	2.80 .10	20x4 3/4	7.15 .50
20x4-40-21"	2.85 .10	20x4 3/4	7.25 .50
20x4-40-21"	2.90 .10	20x4 3/4	7.35 .50
20x4-40-21"	2.95 .10	20x4 3/4	7.45 .50
20x4-40-21"	3.00 .10	20x4 3/4	7.55 .50
20x4-40-21"	3.05 .10	20x4 3/4	7.65 .50
20x4-40-21"	3.10 .10	20x4 3/4	7.75 .50
20x4-40-21"	3.15 .10	20x4 3/4	7.85 .50
20x4-40-21"	3.20 .10	20x4 3/4	7.95 .50
20x4-40-21"	3.25 .10	20x4 3/4	8.05 .50
20x4-40-21"	3.30 .10	20x4 3/4	8.15 .50
20x4-40-21"	3.35 .10	20x4 3/4	8.25 .50
20x4-40-21"	3.40 .10	20x4 3/4	8.35 .50
20x4-40-21"	3.45 .10	20x4 3/4	8.45 .50
20x4-40-21"	3.50 .10	20x4 3/4	8.55 .50
20x4-40-21"	3.55 .10	20x4 3/4	8.65 .50
20x4-40-21"	3.60 .10	20x4 3/4	8.75 .50
20x4-40-21"	3.65 .10	20x4 3/4	8.85 .50
20x4-40-21"	3.70 .10	20x4 3/4	8.95 .50
20x4-40-21"	3.75 .10	20x4 3/4	9.05 .50
20x4-40-21"	3.80 .10	20x4 3/4	9.15 .50
20x4-40-21"	3.85 .10	20x4 3/4	9.25 .50
20x4-40-21"	3.90 .10	20x4 3/4	9.35 .50
20x4-40-21"	3.95 .10	20x4 3/4	9.45 .50
20x4-40-21"	4.00 .10	20x4 3/4	9.55 .50
20x4-40-21"	4.05 .10	20x4 3/4	9.65 .50
20x4-40-21"	4.10 .10	20x4 3/4	9.75 .50
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20x4-40-21"	4.20 .10	20x4 3/4	9.95 .50
20x4-40-21"	4.25 .10	20x4 3/4	10.05 .50
20x4-40-21"	4.30 .10	20x4 3/4	10.15 .50
20x4-40-21"	4.35 .10	20x4 3/4	10.25 .50
20x4-40-21"	4.40 .10	20x4 3/4	10.35 .50
20x4-40-21"	4.45 .10	20x4 3/4	10.45 .50
20x4-40-21"	4.50 .10	20x4 3/4	10.55 .50
20x4-40-21"	4.55 .10	20x4 3/4	10.65 .50
20x4-40-21"	4.60 .10	20x4 3/4	10.75 .50
20x4-40-21"	4.65 .10	20x4 3/4	10.85 .50
20x4-40-21"	4.70 .10	20x4 3/4	10.95 .50
20x4-40-21"	4.75 .10	20x4 3/4	11.05 .50
20x4-40-21"	4.80 .10	20x4 3/4	11.15 .50
20x4-40-21"	4.85 .10	20x4 3/4	11.25 .50
20x4-40-21"	4.90 .10	20x4 3/4	11.35 .50
20x4-40-21"	4.95 .10	20x4 3/4	11.45 .50
20x4-40-21"	5.00 .10	20x4 3/4	11.55 .50
20x4-40-21"	5.05 .10	20x4 3/4	11.65 .50
20x4-40-21"	5.10 .10	20x4 3/4	11.75 .50
20x4-40-21"	5.15 .10	20x4 3/4	11.85 .50
20x4-40-21"	5.20 .10	20x4 3/4	11.95 .50
20x4-40-21"	5.25 .10	20x4 3/4	12.05 .50
20x4-40-21"	5.30 .10	20x4 3/4	12.15 .50
20x4-40-21"	5.35 .10	20x4 3/4	12.25 .50
20x4-40-21"	5.40 .10	20x4 3/4	12.35 .50
20x4-40-21"	5.45 .10	20x4 3/4	12.45 .50
20x4-40-21"	5.50 .10	20x4 3/4	12.55 .50
20x4-40-21"	5.55 .10	20x4 3/4	12.65 .50
20x4-40-21"	5.60 .10	20x4 3/4	12.75 .50
20x4-40-21"	5.65 .10	20x4 3/4	12.85 .50
20x4-40-21"	5.70 .10	20x4 3/4	12.95 .50
20x4-40-21"	5.75 .10	20x4 3/4	13.05 .50
20x4-40-21"	5.80 .10	20x4 3/4	13.15 .50
20x4-40-21"	5.85 .10	20x4 3/4	13.25 .50
20x4-40-21"	5.90 .10	20x4 3/4	13.35 .50
20x4-40-21"	5.95 .10	20x4 3/4	13.45 .50
20x4-40-21"	6.00 .10	20x4 3/4	13.55 .50
20x4-40-21"	6.05 .10	20x4 3/4	13.65 .50
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20x4-40-21"	6.15 .10	20x4 3/4	13.85 .50
20x4-40-21"	6.20 .10	20x4 3/4	13.95 .50
20x4-40-21"	6.25 .10	20x4 3/4	14.05 .50
20x4-40-21"	6.30 .10	20x4 3/4	14.15 .50
20x4-40-21"	6.35 .10	20x4 3/4	14.25 .50
20x4-40-21"	6.40 .10	20x4 3/4	14.35 .50
20x4-40-21"	6.45 .10	20x4 3/4	14.45 .50
20x4-40-21"	6.50 .10	20x4 3/4	14.55 .50
20x4-40-21"	6.55 .10	20x4 3/4	14.65 .50
20x4-40-21"	6.60 .10	20x4 3/4	14.75 .50
20x4-40-21"	6.65 .10	20x4 3/4	14.85 .50
20x4-40-21"	6.70 .10	20x4 3/4	14.95 .50
20x4-40-21"	6.75 .10	20x4 3/4	15.05 .50
20x4-40-21"	6.80 .10	20x4 3/4	15.15 .50
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20x4-40-21"	7.20 .10	20x4 3/4	15.95 .50
20x4-40-21"	7.25 .10	20x4 3/4	16.05 .50
20x4-40-21"	7.30 .10	20x4 3/4	16.15 .50
20x4-40-21"	7.35 .10	20x4 3/4	16.25 .50
20x4-40-21"	7.40 .10	20x4 3/4	16.35 .50
20x4-40-21"	7.45 .10	20x4 3/4	16.45 .50
20x4-40-21"	7.50 .10	20x4 3/4	16.55 .50
20x4-40-21"	7.55 .10	20x4 3/4	16.65 .50
20x4-40-21"	7.60 .10	20x4 3/4	16.75 .50
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20x4-40-21"	8.00 .10	20x4 3/4	17.55 .50
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20x4-40-21"	8.30 .10	20x4 3/4	18.15 .50
20x4-40-21"	8.35 .10	20x4 3/4	18.25 .50
20x4-40-21"	8.40 .10	20x4 3/4	18.35 .50
20x4-40-21"	8.45 .10	20x4 3/4	18.45 .50
20x4-40-21"	8.50 .10	20x4 3/4	18.55 .50
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20x4-40-21"	8.95 .10	20x4 3/4	19.45 .50
20x4-40-21"	9.00 .10	20x4 3/4	19.55 .50
20x4-40-21"	9.05 .10	20x4 3/4	19.65 .50
20x4-40-21"	9.10 .10	20x4 3/4	19.75 .50
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20x4-40-21"	9.30 .10	20x4 3/4	20.15 .50
20x4-40-21"	9.35 .10	20x4 3/4	20.25 .50
20x4-40-21"	9.40 .10	20x4 3/4	20.35 .50
20x4-40-21"	9.45 .10	20x4 3/4	20.45 .50
20x4-40-21"	9.50 .10	20x4 3/4	20.55 .50
20x4-40-21"	9.55 .10	20x4 3/4	20.65 .50
20x4-40-21"	9.60 .10	20x4 3/4	20.75 .50
20x4-40-21"	9.65 .10	20x4 3/4	20.85 .50
20x4-40-21"	9.70 .10	20x4 3/4	20.95 .50
20x4-40-21"	9.75 .10	20x4 3/4	21.05 .50
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20x4-40-21"	9.90 .10	20x4 3/4	21.35 .50
20x4-40-21"	9.95 .10	20x4 3/4	21.45 .50
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20x4-40-21"	10.35 .10	20x4 3/4	22.25 .50
20x4-40-21"	10.40 .10	20x4 3/4	22.35 .50
20x4-40-21"	10.45 .10	20x4 3/4	22.45 .50
20x4-40-21"	10.50 .10	20x4 3/4	22.55 .50
20x4-40-21"	10.55 .10	20x4 3/4	22.65 .50
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20x4-40-21"	10.80 .10	20x4 3/4	23.15 .50
20x4-40-21"	10.85 .10	20x4 3/4	23.25 .50
20x4-40-21"	10.90 .10	20x4 3/4	23.35



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WATSON E. COLEMAN,
REGISTERED PATENT LAWYER

Victor Building, 724 Ninth Street, N. W.
WASHINGTON, D.C.

RIDING ON LAZY AIR

(Continued from page 126A)

"Everybody asks that question," the tester replies. "Remember this; it's air pressure and not air volume that causes trouble in blowouts. In the first place, it's next to impossible to make these new tires blow. We've tried and tried. Finally we attached a shotgun to the front end and fired both barrels through the tire at sixty miles an hour. There was no upheaval. There can't be. The pressure isn't sufficient to make your car jump out of control. And punctures; say, we ran over tacks until the tires looked like pincushions, yet we always had plenty of warning to slow down before the tire went flat. Low-pressure air is lazy air; it takes a long time to get out."

For your every question, he has a barrage of answers—answers not based upon opinions but upon facts gleaned from thousand upon thousands of grueling test miles.

Perhaps you have heard that the flabby tires drag in acceleration. He'll show you facts to prove that the difference between ultra-balloons and conventional balloons is scarcely one-tenth of a second from five to fifty miles per hour. Perhaps you have heard that the fat tires are gas-eaters. He'll show you that they yield to within two per cent the mileage of your present equipment. Perhaps you have heard that maximum speed of the car is reduced. He'll prove to you that there is less than two-tenths mile per hour difference at full throttle. Tell him that the new tires are hard to steer, and he'll defy you to detect any difference between a balloon-tired car and one which has been properly designed for lower-pressure equipment.

Further, he'll show you convincing evidence that by pillowing road shocks and preventing their transmission to the car, the "satisfactory life" of chassis and body is lengthened by thousands and thousands of miles, and maintenance costs very substantially reduced.

"Forget the notion that you ride on tires," he advises. "Remember that you actually ride on air. The tire is only the container. Air under high pressure is 'hard' air. Low-pressure air is soft. Why not ride on soft air?"

And, what a ride!

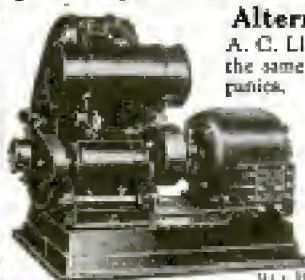
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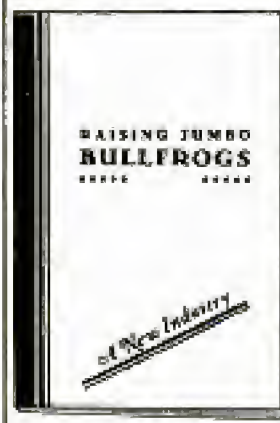


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